



DigiView User's Guide

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Installing the Software

Part



1 Installing the Software

Version 3.0 05/01/06

Chances are that you already know this part but.....

Installing from CDROM

Insert the CDROM in your CD Drive. If the launch-pad does not auto-start, then go to the CDROM drive and dbl-click on the TECH_CD.EXE file to launch it. Select the DIGIVIEW software and follow the prompts to install the software. All of the defaults offered are acceptable but you may over-ride any of them you want.

Installing from a WEB Download

If you downloaded the software from our web site, double-click on the file you downloaded to launch the self-extracting install program. Follow the prompts to install the software. All of the defaults offered are acceptable but you may over-ride any of them you want.

⇒⇒⇒ **MAKE NOTE OF THE DESTINATION DIRECTORY** (the default is c:\program files\Techtools\DigiView.)

You will need to know this when Windows installs the USB drivers.

1.1 Installing the USB Drivers

Windows handles installing the USB drivers the first time you connect the DigiView to your system.

- 1. Plug DigiView into a POWERED HUB** (one with its own power supply) **or directly into a USB port on your PC.** You CAN NOT use a bus-powered hub; it does not have enough power to operate DigiView.
- 2.** When the Windows 'New Hardware Wizard' starts, select 'NEXT' until it prompts you for the driver location.
- 3.** If you are installing from CDROM, select the 'SEARCH CDROM' option. Otherwise, select the 'search specific path' option and enter the path to the install directory noted above (default: c:\program files\techtools\digiview).
- 4.** Click NEXT and Windows will install the drivers.

Configuration

Part



2 Configuration

The DigiView software is designed to make configuration an easy task and less time consuming than most PC based analyzer systems. The easier it is to configure and understand your Capture and Analysis tool, the easier it will be to achieve successful results.

Configuration options can be accessed by using the CONFIG menu.

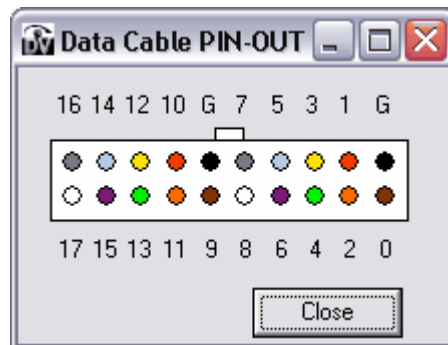
The first topic in this section covers the physical channel connections and cable color scheme. The next section provides detailed information on defining trigger conditions and associating a signal type with the physical channels. The last two sections deal with user preferences.

- [Connecting Data Lines](#)
- [Defining Signals and Triggers](#)
- [Color Themes](#)
- [Environment Options](#)

2.1 Connecting the Data Lines

The DigiView data cable has 18 data lines and 2 grounds. These are partitioned into 2 identical groups. **Each group has a ground and 9 data signals.** The leads are color-coded. Black is ground, brown the first data signal and so on in standard resistor color-code order. The second group of signals is identical.

The figure below shows a physical layout of the cable, the data line definitions and the color codes. This figure is available by clicking the PINOUT button in the "[Edit Triggers & Signals](#)" window (selected from the CONFIG menu). This opens a non-modal window so you can leave it open while you work if desired.



The data cable is made of high quality, extremely flexible wire and high quality connectors. It is expensive so please remember your mom's advice and pull on the connectors; not the wires.

The connectors are designed to mate to .025 square posts and can be side-stacked on 100mil centers, making them ideal for direct connection to standard square post connectors. Additionally, they mate firmly with the included micro-grabber hooks for connecting to IC leads.

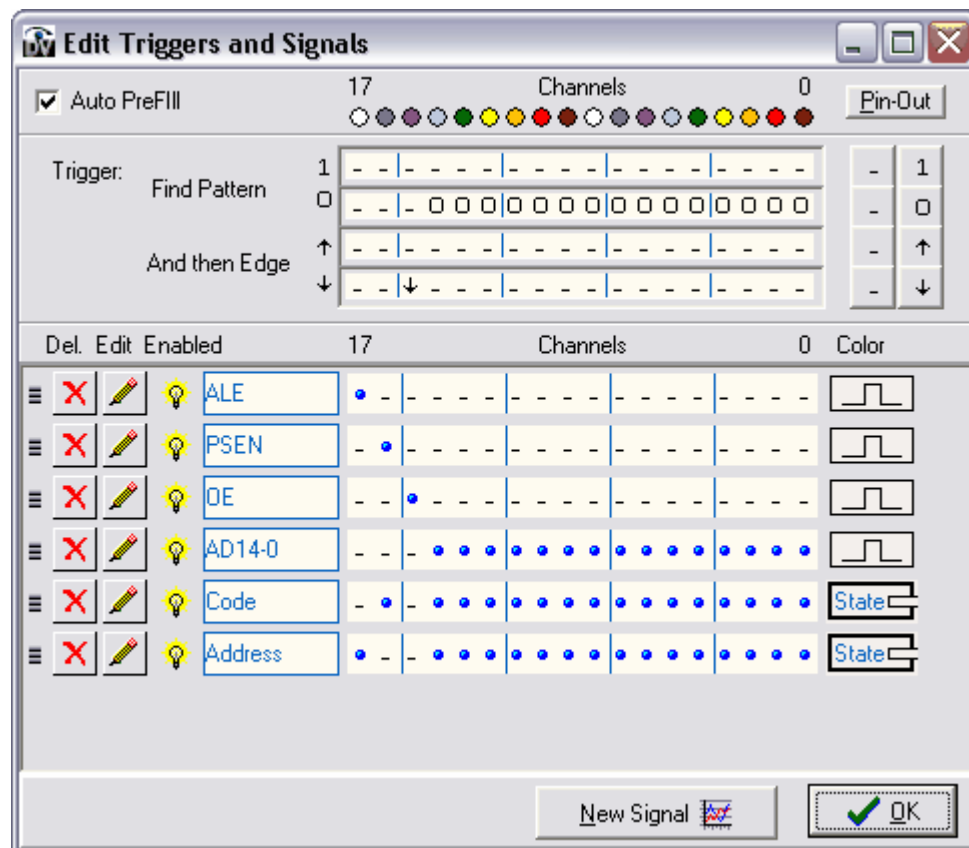
The DigiView DV1-100 hardware is designed to monitor digital logic signals in the 0 to 5V range. Standard overshoots and undershoots common to digital systems will not harm it. **The data lines have extra static protection circuits, current limits and impulse suppression.** However, mishandling could still damage them. Simply treat them like you (should) treat your valuable one-of-a-kind target and DigiView will give you years of service.

2.2 Defining Signals and Triggers

The hardware will ignore any data lines that are not defined as part of a waveform or part of a trigger. This prevents unused signals from eating up the sample buffer space, even if they are connected to active signals. Waveforms that are DEFINED but disabled, will be captured but not displayed.

DigiView uses [real-time hardware compression](#) to greatly extend its capture buffer. Most data you are likely to monitor lends itself well to our compression technique. Compression ratios of 100:1 are common. With sparse data, compression ratios of over 200,000:1 are achievable. Since the degree of compression depends on the amount of activity, you will achieve maximum compression if you only define signals of interest. DigiView model DV1-100 ALWAYS samples at a 100MHz rate.

Select the CONFIG -> Triggers & Signals menu to open the Waveform and trigger definition window.



[Signals](#)

[Triggers](#)

2.2.1 Signals

The DigiView DV1-100 hardware has 18 physical channels. However, we like to think in terms of symbolic names representing individual signals (clock,ALE) or groups of signals (DataBus, Address) rather than channel numbers(0,1,2..). We start by defining SIGNALS in terms of CHANNELS. This is the only place we deal directly with physical channels. The remainder of the software deals in terms of signal names rather than channel numbers. When we define signals, we are mapping a signal NAME to one or more physical channels.

Click on the **'New'** button to create a new signal. From the pop-up, choose the desired signal type to create and a signal editor will appear. The editor will create a new signal definition with a default name and the next unused channels(s) selected. You can rename the signal, change the channels to use for this signal definition and set all associated options from the editor. (For details on signal options, see the section: [Signal Editors](#))

The main purpose of the signal section of the config screen is to provide an overview of all current signal definitions and their related channels. You can also Add, Edit or Delete signals from this screen, determine each signal's type, its basic colors and its enabled status.

The configuration screen is arranged in a grid with columns representing the physical channels and one row per defined signal.



Channel 0 is in the farthest right column and channel 17 is in the farthest left column (as marked in the header.) Light blue lines appear every 4th channel (or nibble).

In addition to the color references at the top of the window, you can click on the 'pin-out' button to see a physical layout of the channel connector, with color codes.

Note that it is important to enable only channels that are actually being connected to your circuit. The remaining, unconnected channels will be floating and will most likely pick up noise or power line hum. If enabled, these transitions will get stored, wasting storage space. It is also important to connect the black ground wires to your target's ground so that the analyzer and the target have a common ground reference.

Changing the Signal order -

When adding a large number of signal definitions, you may want to change some of their positions to organize or group related signals. To change the display order, grab the small handle in the left margin with your mouse and drag the definition to a new position.

Delete Signal -

You can delete a signal definition by clicking on the 'X'.

Edit Signal Properties -

You can change the properties of a signal definition by clicking this button. (see: [Signal Editors](#))

Enabled Status -  




Indicates the enabled state of the signal. When the lightbulb is ON, the signal is enabled. This value can be changed by editing the signal's properties. (see: [Signal Editors](#))

Signal Name -

The name of this signal definition. This value can be changed by editing the signal's properties. (see: [Signal Editors](#))

Associated Channels - 

All channels associated with this signal definition will be indicated in this display as a blue "dot". Channel 0 is in the farthest right column and channel 17 is in the farthest left column (as marked in the header.) Light blue lines appear every 4th channel and non associated channels appear as '-' as a reference. Also, colored circles at the top show each channel's wire color (above the trigger definitions). Notice that there are only 9 colors so the color sequence repeats (channels 0 and 9 are both brown).

Signal Colors and Type -   , etc.

You can see the color of a signal and determine the type by the graphical indicator displayed to the right of the channel indicators. Each signal type will display a unique graphic with representative colors.

Add a new Signal - 

Add new signal definitions by pressing the **NEW** button at the bottom of the CONFIG window. From the pop-up, choose the desired signal type to create a new signal definition and its editor will appear. The editor will display default properties including the next unused channel(s) or, if all channels have already been defined in other signals, the highest channels. You can rename the signal, change the channels to use for this signal definition and set all associated options from its editor.

2.2.1.1 Signal Editors

DigiView provides several "Signal" type definitions which allow unique methods of interpreting and displaying the raw data captured on the logic channels. Each Signal type has a unique editor with relevant options for its type. From the editor you will also assign some of the physical logic channels to be used for this new signal definition. (see: [Signals](#), [Connecting Data Lines](#))

You may choose to repeat the use of some channels in multiple Signal definitions in order to interpret the data differently and gain a perspective that is relative to your current point of interest. This can be done easily by creating a new Signal using the definition with the properties you require. Using the same channels in multiple definitions will not have any effect on the actual capture, but can greatly increase your ability to analyze the data and present visual representation to others.

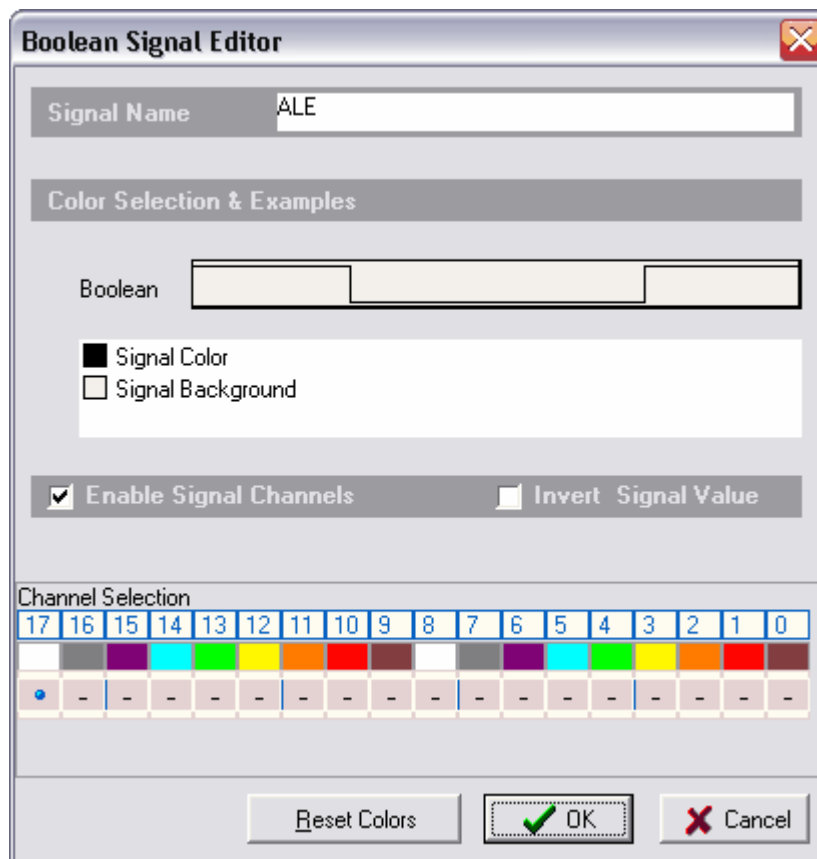
The currently available Signal Types are listed below. Details of each type's properties are described in the following sections.

- [Boolean](#) - single channel viewing.
- [Bus](#) - multi-channel viewing.

- [Asynchronous](#) - serial UART analysis, pre-selected and custom baud rates, channel inversion option, from 4 to 8 bit selectable, parity option.
- [Analog](#) - multiple channels combined to a single analog view.
- [I2C](#) - Complete I2C protocol analysis. 7bit/10bit addressing, High Speed Mode Master Codes, General Call support.
- [State](#) - Filters multi-channel data by state of a single channel, selectable CLK/DATA inversion, selectable transition state of Rising/Falling/Both, additional Enable channel for filtering.
- [Synchronous](#) - from 1 to 32 bit protocols, suitable for SPI analysis, selectable CLK/DATA inversion, selectable Rising/Falling/Both clock edges, LSB/MSB selection, additional Enable channel for filtering and synchronizing.

2.2.1.1.1 Boolean

The Boolean Signal is the most common method of viewing captured data. Boolean Signals provide viewing of the logic level of a single channel at any given point in time.



Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in

brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, searches, tables, lists (if applicable), exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

Invert Signal Value - This item is de-selected (unchecked) by default. Check this item to have the value of the captured channels "inverted" before processing or displaying for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

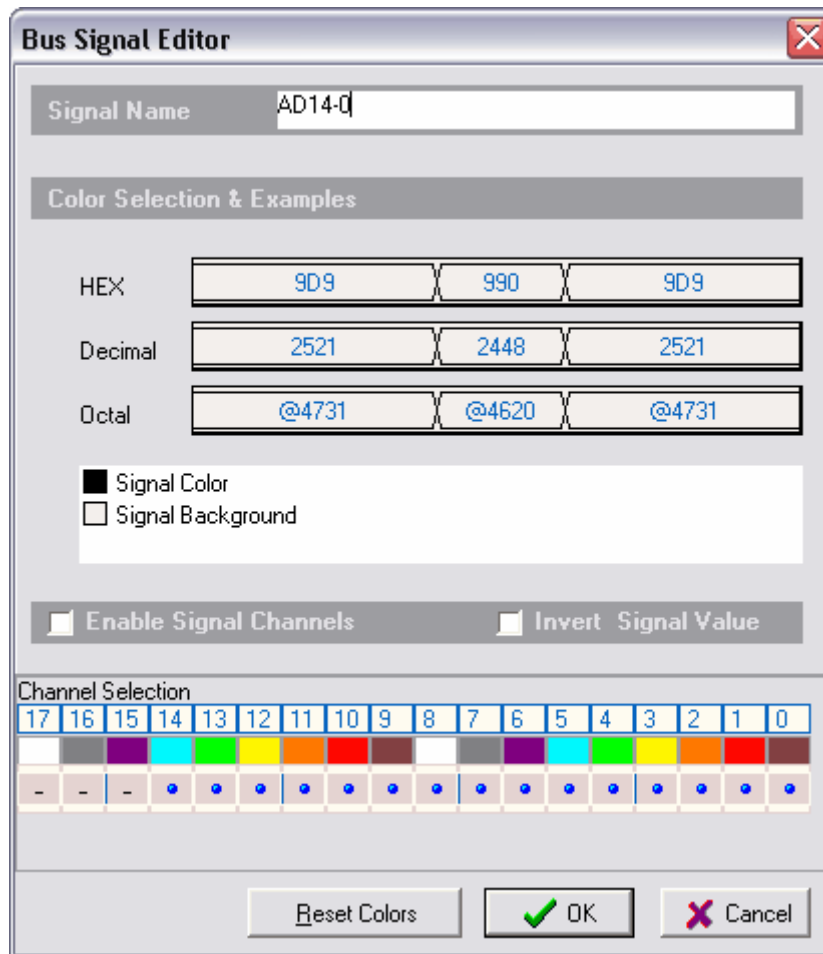
Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as all of the channels do in the graphic above).

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.2 Bus

The Bus Signal is the second most common method of viewing captured data. Bus Signals provide viewing of multiple channels as a single value at any given point in time.



Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, searches, tables, lists (if applicable), exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable

capture space.

Invert Signal Value - This item is de-selected (unchecked) by default. Check this item to have the value of the captured channels "inverted" before processing or displaying for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

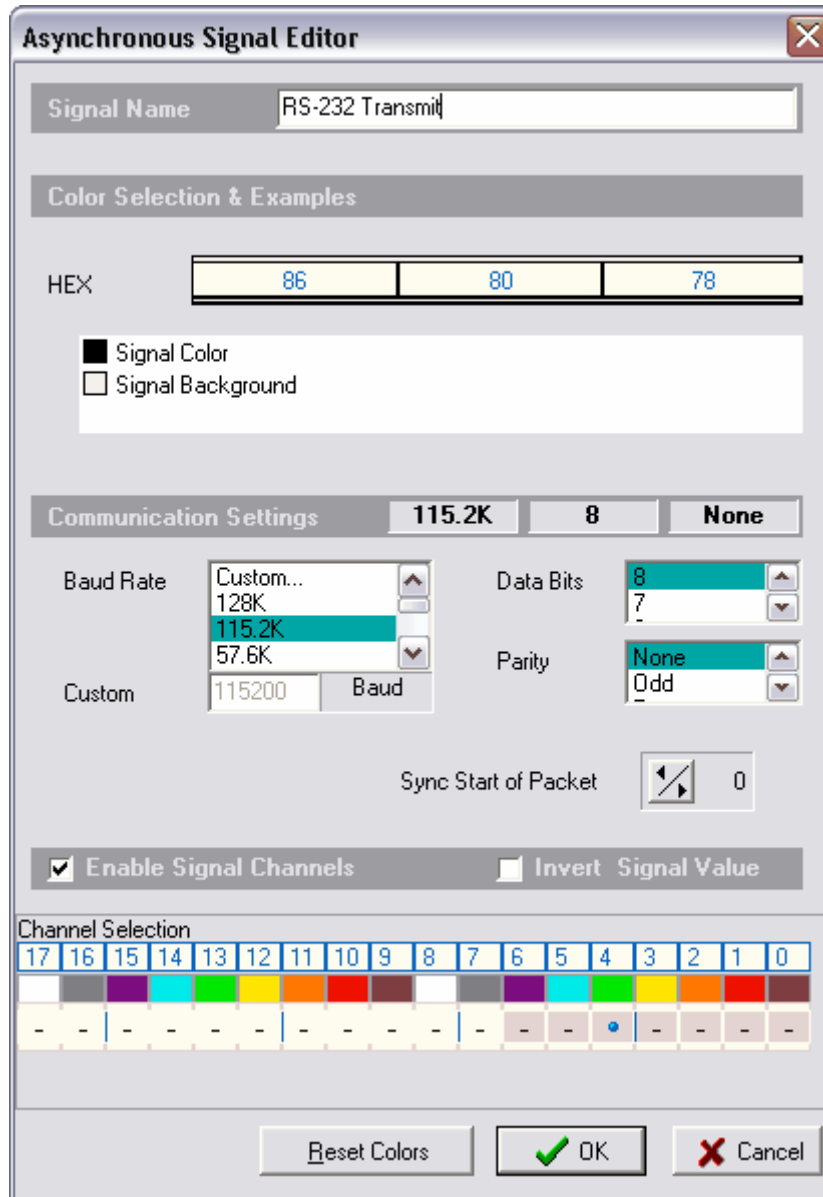
Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as all of the channels do in the graphic above).

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.3 Asynchronous

Use the Asynchronous Signal type to see the capture from a single channel decoded and displayed as serial packets of data with a specific bit count and baud rate.



Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, searches, tables, lists (if applicable), exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing

modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Communication Settings - The current communication settings for the decoder are displayed in the order of Baud Rate, Data Bits and Parity. To change these items, use the appropriate property editors below. Each signal definition has its own decoder, so these settings will not affect other Synchronous signal definitions.

Baud Rate - Select from one of the pre-defined baud rates or select "Custom" to enter a non-standard rate. Custom rates should be specified fully (i.e. 115.2K should be specified as 115200 Baud) as shown in the Custom box above.

Data Bits - Select the number of DATA bits in the packet. Options are from 4 to 8 bits.

Parity - Choose the desired parity. Options are NONE, ODD, EVEN, ONE, ZERO.

Sync Start of Packet - Use this button to synchronize to the beginning of the first packet in the captured data. Normally this is unnecessary unless DigiView can not automatically find the beginning of a packet in the data captured. Right-Click on the button to advance the decoder by one bit and Left-Click to backup by one bit. Click multiple times or hold the button down to repeat the action. The decoders "shift-bit" action is performed in a circular fashion and is limited to the number of bits required for a single packet. The numerical display to the right of the button tracks the bit position from the beginning of the available data.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

Invert Signal Value - This item is de-selected (unchecked) by default. Check this item to have the value of the captured channels "inverted" before processing or displaying for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

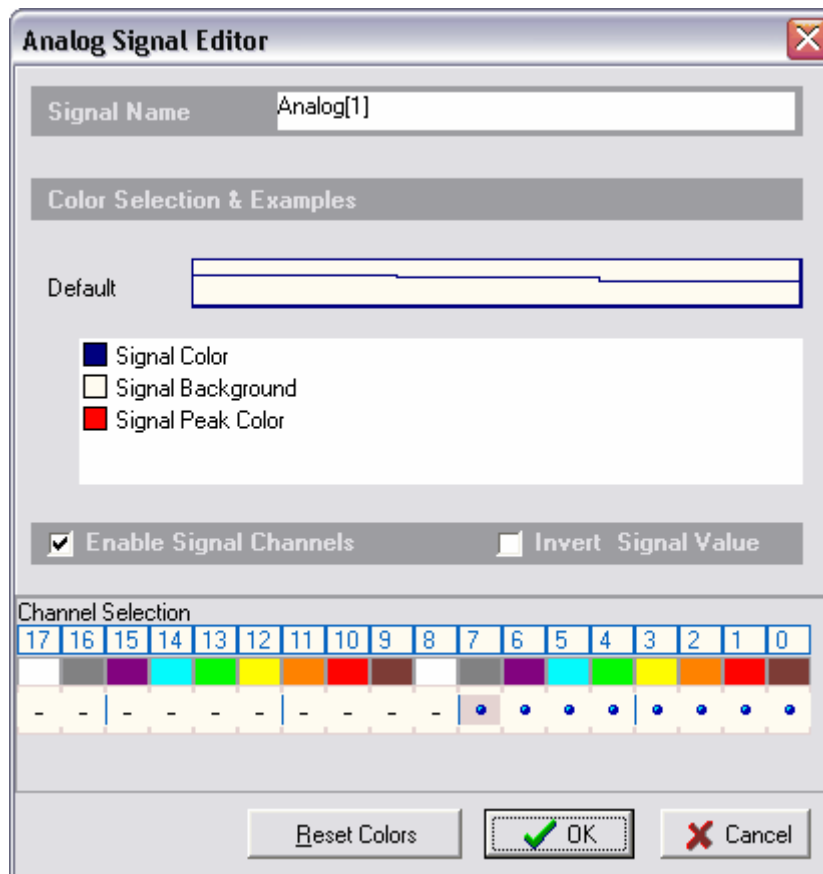
To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as channels 0 through 6 do in the graphic above).

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.4 Analog

The Analog Signal also provides viewing of multiple channels as a single value, but displays this value as a proportional value in the Wave Form views. The waveform height will be the value of all the channels, proportional to the maximum numerical value of the number of channels chosen.

The chosen channels do not have to be consecutive. Any "skipped" channels in this definition will be ignored and the selected channels "packed" to form the bits of a single value. The lowest selected channel will be the least significant bit (LSB). In the graphic below, channel 0 is the LSB and channel 7 is the MSB.



Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, searches, tables, lists (if applicable), exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to

completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

Invert Signal Value - This item is de-selected (unchecked) by default. Check this item to have the value of the captured channels "inverted" before processing or displaying for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

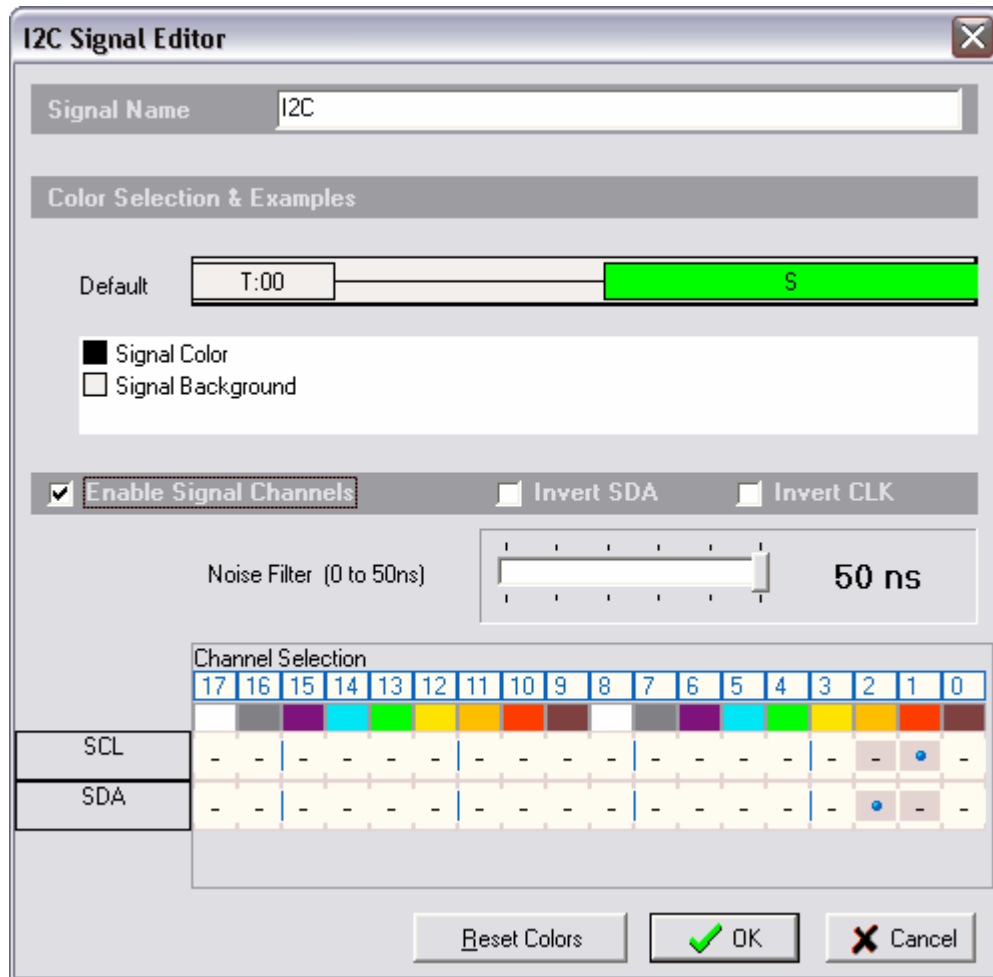
Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as channel 7 does in the graphic above).

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.5 I2C

Use the I2C Signal type to decode two channels using the full I2C serial protocol.



Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tables, Lists (if applicable), Exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable

capture space.

Invert SDA/CLK - These items are de-selected (unchecked) by default. Check these items to have the value of the associated channel "inverted" before being decoded. This setting will not affect any other signal definitions that may use the same channels.

Noise Filter - This selection determines whether to ignore short noise pulses and if so, the length of pulse to suppress. This selection defaults to 50ns to accommodate a Standard-Mode I2C bus system. To turn off filtering, change this setting to "0".

Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as channels 1 and 2 do in the graphic above).

SCL - Select a channel to decode as the I2C CLOCK.

SDA - Select a channel to decode as the I2C DATA.

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.6 State

Use the State Signal type to see the data from one or more channels only when the state of another channel changes. This other channel will be used as a "state clock" and optionally the Clock can be qualified by the logic state of an additional channel (Enable). This signal type can be used to mask invalid data during bus transitional periods or the "noise" that occurs during unqualified periods, making it easier to analyze true data.

State Signal Editor

Signal Name: Code

Color Selection & Examples

Default: 9D9 9D9 9FD

Signal Color
 Signal Background

Qualifier

Clock Edge: Rising
Enable State: High

Enable Signal Channels Invert CLK Invert DATA

Channel Selection		17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CLK		-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DATA		-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Enable		-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-

Reset Colors OK Cancel

Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tables, Lists (if applicable), Exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Qualifier - These settings determine how the data of the selected channels will be decoded. To change these items, use the appropriate property editors below. Each signal definition has its own decoder, so these settings will not affect other signal definitions.

Clock Edge - Choose the transition state of the Clock channel that determines when the data channels are "valid". Options are FALLING, RISING, BOTH. Whenever the Clock channel transition matches the selection, the data channels will be decoded. Set this option to "Both" to decode the data on every transition of the Clock channel.

Enable State - Choose the logic level of the Enable channel that determines when the clock channel is "valid". Options are LOW, HIGH, IGNORE. Whenever the Enable channel matches the indicated state, the clock and data channels will be decoded. Set this option to "Ignore" if these channels are always valid and you do not wish to use the Enable channel as a qualifier.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

Invert CLK/Data - These items are de-selected (unchecked) by default. Check these items to have the value of the associated channel "inverted" before being decoded. This setting will not affect any other signal definitions that may use the same channels.

Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as all of the channels do in the graphic above).

CLK - Select a channel to decode as a CLOCK to qualify the Data.

Data - Select one or channels to decode as the DATA.

Enable - Select a channel to qualify the CLOCK.

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.1.1.7 Synchronous

Use the Synchronous Signal type to see the data from a single channel decoded as a serial "packet" by using another channel as the bit clock. Optionally you can use the "Enable" channel to qualify the clock. The decoded data will be displayed as serial packets using the specified bit count, bit order (LSB/MSB) and Clock edge.

Synchronous Serial Signal Editor

Signal Name: SPI Slave1

Color Selection & Examples

Default: [Color Bar] 7 80

Signal Color
 Signal Background

Communication Settings

Data Bits (1-32): 8 LSB First Enable State: High

Clock Edge: Falling Sync Start of Packet: 0

Enable Signal Channels Invert CLK Invert DATA

	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CLK																		
DATA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enable	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reset Colors OK Cancel

Signal Name - Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tables, Lists (if applicable), Exports and all menu references.

Color Selection & Examples - If this signal definition has multiple Wave Form viewing

modes, an example of each mode is displayed in the current color scheme, followed by a listing of any items that allow custom colors (i.e. Signal Color, Signal Background). Click on an item in the list to select a new color.

Communication Settings - These settings determine how the data of the selected channels will be decoded. To change these items, use the appropriate property editors below. Each signal definition has its own decoder, so these settings will not affect other Synchronous signal definitions.

Data Bits - Select the number of DATA bits in the packet. Options are from 1 to 32 bits.

Enable State - Choose the logic level of the Enable channel that determines when the clock channel is "valid". Options are LOW, HIGH, IGNORE. Whenever the Enable channel matches the indicated state, the clock and data channel will be decoded. Set this option to "Ignore" if these channels are always valid and you do not wish to use the Enable channel as a qualifier.

Clock Edge - Choose the transition state of the Clock channel that determines when the data channel is "valid". Options are FALLING, RISING, BOTH. Whenever the Clock channel transition matches the selection, the data channel will be decoded. Set this option to "Both" to decode the data on every transition of the Clock channel.

Sync Start of Packet - Use this button to synchronize to the beginning of the first packet in the captured data. Normally this is unnecessary unless you have set the Enable qualifier to "Ignore". Unlike Asynchronous signals, Synchronous signals do not have a specific bit rate, so DigiView will not automatically find the beginning of a packet when the qualifier is not used. Right-Click on the button to advance the decoder by one bit and Left-Click to backup by one bit. Click multiple times or hold the button down to repeat the action. The decoders "shift-bit" action is performed in a circular fashion and is limited to the number of bits required for a single packet. The numerical display to the right of the button tracks the bit position from the beginning of the available data.

Enable Signal Channels - This item is selected (checked) by default. Uncheck this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

Invert CLK/Data - These items are de-selected (unchecked) by default. Check these items to have the value of the associated channel "inverted" before being decoded. This setting will not affect any other signal definitions that may use the same channels.

Channel Selection - This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)). Channels that are selected for this signal will replace the " - " with a blue "dot" as shown above. Channels that are already defined in other signal definitions will have a darker color around the selection area for the channel (as channels 0 through 6 do in the graphic above).

CLK - Select a channel to decode as a CLOCK to qualify the Data channel.

Data - Select a channel to decode as the DATA.

Enable - Select a channel to Qualify the CLOCK.

Reset Colors - This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)).

2.2.2 Triggers

You can define a TRIGGER condition. When the hardware detects this condition, it will 'TRIGGER' the logic analyzer. When the sample buffer fills (or you manually STOP it), the data is transferred to the PC. The software on the PC then displays the data to you. The trigger point is centered on the screen and is always TIME 0. All data prior to the trigger is negative time and all data after the trigger is positive time. If you stop the analyzer before a trigger condition is detected, the last collected sample is considered the trigger (the buffer ends at time 0).

In this version, the triggers are specified in terms of channels. Since the setup is done on the same screen as the signals, you can see the correlation between physical channels and signal names at the same time you are defining triggers, so there is little difference. In the final release, the trigger setup will be separated from the signal setup. Additionally, the trigger setup will be specified in terms of signals, rather than channels in preparation for the more complex triggers available in the next generation analyzers.

There are actually two complete trigger circuits in the DV1-100; level and edge. Either of these can be used to specify a trigger or they can be combined to create a qualified trigger.

The level trigger is a pattern match detector. You can configure it to match any combination of 0,1 or don't cares across all 18 channels. The edge trigger circuit is a 36 input OR of rising edge and falling edge detectors. You can specify a trigger on rising, falling or transition on any combination of channels (rising edge of ALE or falling edge of OE or falling edge of WT or transition on clock...). All '-' entries for a channel means "don't care".

When you combine the two trigger circuits, you will get a trigger ONLY if the EDGE detection trigger AND the LEVEL detectors match at the same time. In other words, we detect the specified edge(s) while the level pattern matches.

If you deselect everything (no edges or levels specified) then this is interpreted as 'trigger on the first transition of any defined signal'.

You define the trigger criteria very much like the signals themselves; click in the intersection between the edge or level and the desired channel(s).

Shortcut buttons to the right allow easy setting/clearing of ALL channels.

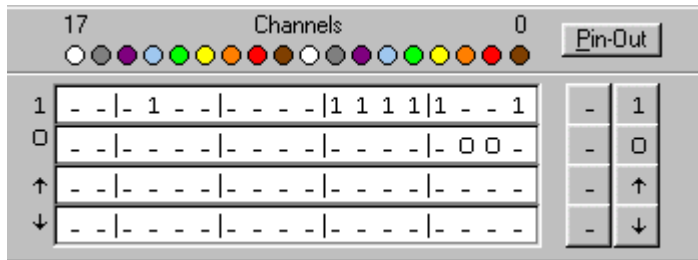
Free Run/No trigger

If you do not define any trigger conditions, it is interpreted to mean trigger immediately.



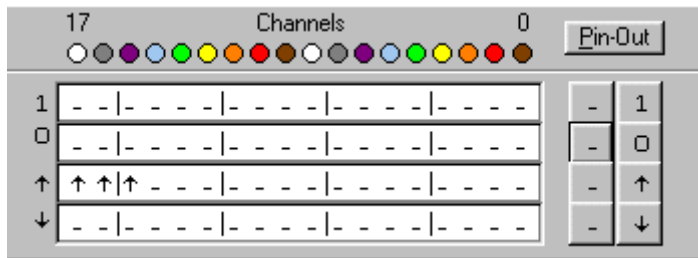
LEVEL trigger

You can trigger on a PATTERN of '1','0' and "don't cares". Simple set a '1' or a '0' on the data lines of interest. All other data lines are considered "don't cares". Whenever the specified pattern is detected, DigiView is triggered.



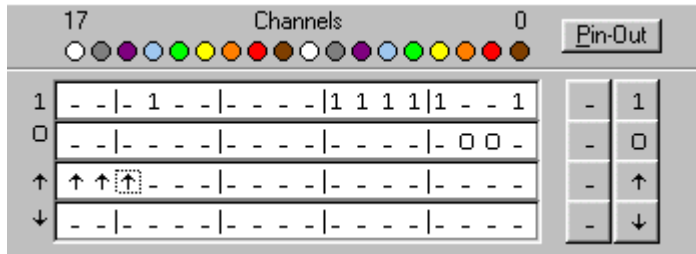
EDGE trigger

You can select 'RISING EDGE', 'FALLING EDGE' or 'EITHER EDGE' on one or more data lines. When ANY of the specified edges occur, DigiView is triggered.



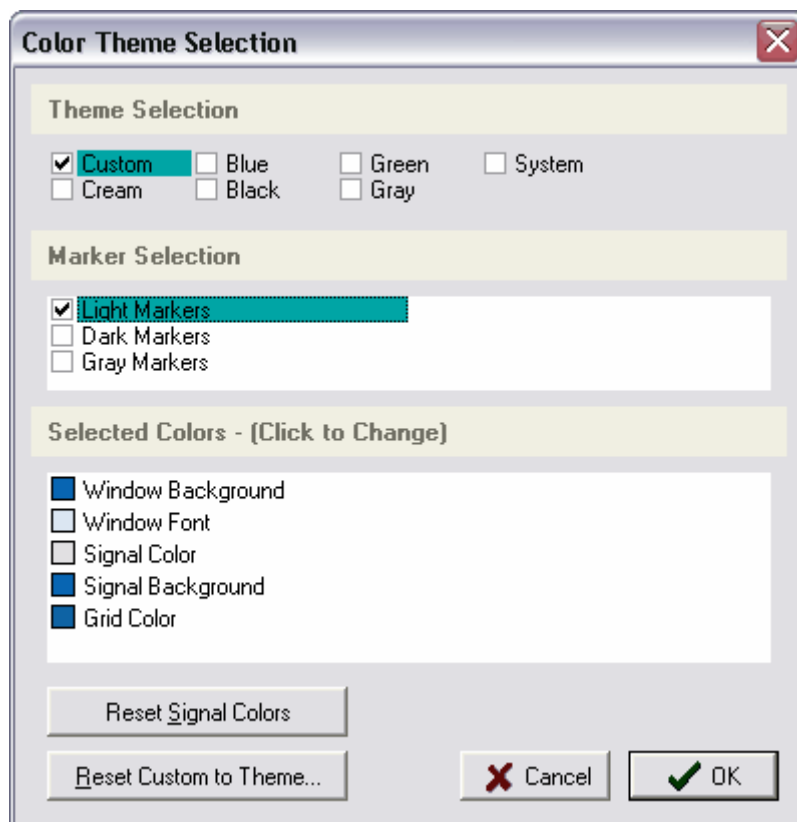
LEVEL then EDGE trigger

If you define a LEVEL pattern AND one or more EDGES as described above, then DigiView will look for the PATTERN occurring for one or more samples, followed by one of the defined edges on the next sample.



2.3 Color Themes

Several pre-defined color schemes and a custom scheme can be selected from the Color Theme Selection window. This window is accessed from the CONFIG menu.



Theme Selection - Select "custom" if you would like to define your own colors, otherwise select from one of the pre-defined color schemes. The Marker selection will be chosen automatically and disabled for some theme choices.

Marker Selection - Depending on the Theme selection, you may be able to choose your marker "color set" preference for the best marker visibility.

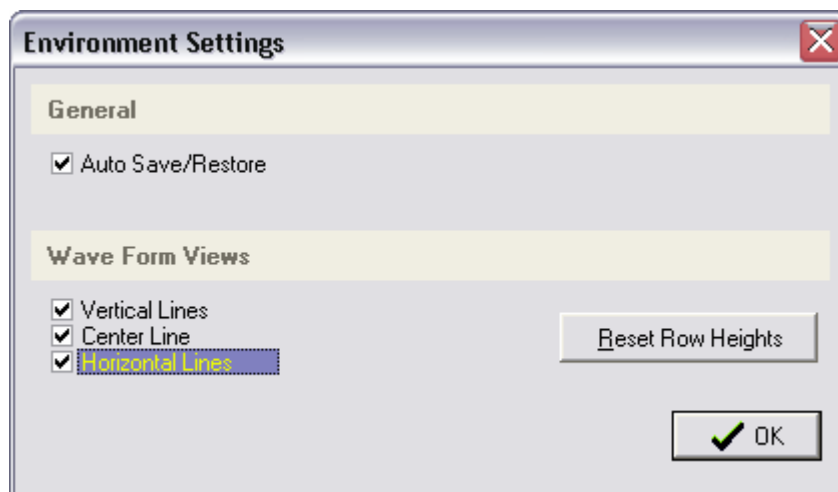
Selected Colors - These items display the current color values of the selected theme. To edit these values, choose "custom" in the Theme Selection area, then click on the item in this section that you would like to change.

Reset Signal Colors - Click this button to reset any Signal colors that do not match the current color theme. Normally, changing the theme will also change a signal's colors. However, if you have customized a signal's color, then it will not change with theme changes. To reset signal colors, click this button and select an option from the menu that appears. To reset a specific signal's colors without changing other signals, use that signal's editor instead.

Reset Custom to Theme - This will reset or change the colors of the custom theme to match any of the pre-defined themes. To make the change, click the button and select one of the themes from the menu that appears.

2.4 Environment Settings

Several Environment options are available and can be accessed from the CONFIG menu.



General

Auto Save/Restore - Select this option to automatically save and restore the "default.dat" file. All current settings and data will be saved to the "default.dat" file when exiting the program and restored when launching the program. (see: [Saving and Restoring](#))

Wave Form Views

Vertical Lines - Check this option to display vertical lines at the time divisions in the Wave Form views.

Center Line - Check this item to display a wide vertical line at the center-time of the Wave Form views.

Horizontal Lines - Check this option to display a horizontal line beneath each visible signal in the Wave Form views. This may be desired to help determine the state of multiple Boolean signals when zoomed in at maximum resolution.

Reset Row Heights - Click this button to reset the heights of all signals in the Wave Form displays back to the default height.

Capturing Data

Part



3 Capturing Data

Once signals and triggers are defined, you can capture a new buffer of data at any time by pressing the 'Run' button. If you tire of waiting on a trigger or it triggers but you tire of waiting for it to fill up the buffer, you can STOP or ABORT the capture.

STOPPING the capture transfers whatever was captured to the PC for your analysis.

ABORTING the capture simply resets the hardware without changing your current data buffer.

Note that the DV1-100 hardware is always capturing and storing data in a circular queue. While you are looking at the last capture, the hardware is pre-filling the buffer up to the 1/2 full point. When the buffer becomes 1/2 full, the hardware continues capturing and storing data in a circular queue fashion so that the most recent data is always available but 1/2 of the buffer is still available.

When you click on 'Run', you are actually arming the trigger circuit. Upon trigger, the hardware allows the buffer to continue past the 1/2 full point and to start filling up. Once the buffer fills, it is transferred to the PC. After the buffer is transferred (or you abort the capture), the hardware immediately resets and begins pre-filling in preparation for the next capture.

(see also: [Understanding Auto-Prefill](#))

3.1 Capture Troubleshooting

Symptom	Causes & Solutions
1. DigiView's Power LED does not stay ON.	<p>(A). The USB subsystem of the PC is turning DigiView Off due to a Bandwidth shortage.</p> <p>REMEDY: Remove other USB devices that use a port on the same hub (internal or external).</p> <p>(B). The USB subsystem of the PC is turning DigiView Off or DigiView is resetting due to insufficient power.</p> <p>REMEDY: If you are using an external hub, change to a POWERED external hub or purchase one of better quality that meets USB specifications.</p>

Symptom	Causes & Solutions
<p>2. DigiView is only identified as a SERIAL device by the USB subsystem.</p>	<p>(A). The USB sub-system is experiencing a problem with corrupted or missing files.</p> <p>REMEDY: Look for a driver update to the USB hub (internal or external) or re-install its drivers. Refresh the DigiView drivers by re-installing the DigiView software.</p> <p>(B). Operating System or computer needs rebooted.</p> <p>REMEDY: Turn off the computer and re-boot the system.</p> <p>(C). The DigiView hardware has been damaged.</p> <p>REMEDY: Call Technical Support for repair information.</p>
<p>3. One of DigiView's channels is connected to a transitioning signal, but the capture does not seem to show any activity or very little activity.</p>	<p>(A). The resolution of the Waveform View is too low to see the activity.</p> <p>REMEDY: Zoom In to see the details of the activity.</p> <p>(B). The signal has been defined with the wrong channel selected.</p> <p>REMEDY: Edit the signal definition and change the channel selection. The colors are repeated for each group of 9 channels, so be sure to select the correct one.</p> <p>(C). The signal definition has been "disabled".</p> <p>REMEDY: Edit the signal definition and uncheck the Disabled option. The channels for disabled signals will not appear in the captured data.</p> <p>(D). Bad Ground reference.</p> <p>REMEDY: Connect one of DigiView's ground wires (black probes) to a ground point as electrically close as possible to the signal connections.</p> <p>(E). Insufficient power, see 1.B above.</p>

Navigating and Analyzing the Data

Part



4 Navigating and Analyzing the Data

This is where you spend most of your time; trying to make sense of what you captured. You will find DigiView software very intuitive and easy to use but it is important to realize that **ZOOM operations occur about the CENTER of the screen**. The tools are all designed to take advantage of this fact to make you more productive.

The general paradigm is to find points of interest, bring them to the center of the screen and then ZOOM. We provide several methods of finding edges and bringing them to the center of the screen so that you can zoom in and out without having to constantly scroll to 'zero-in' on the point of interest.

Navigation, Cursors, Markers & Buttons:

[Waveform Views](#)

[Using Cursors and Markers](#)

[Marquee Zoom](#)

[Toolbar Buttons](#)

[Bird's-Eye View](#)

[Hot-Keys](#)

Viewing the Data in Time-Relative Columns:

[Table Windows](#)

[List Windows](#)

Linking Views into Time-Relative Groups:

[Using Link Groups](#)

Searching the Data:

[Search Overview](#)

[Define Searches](#)

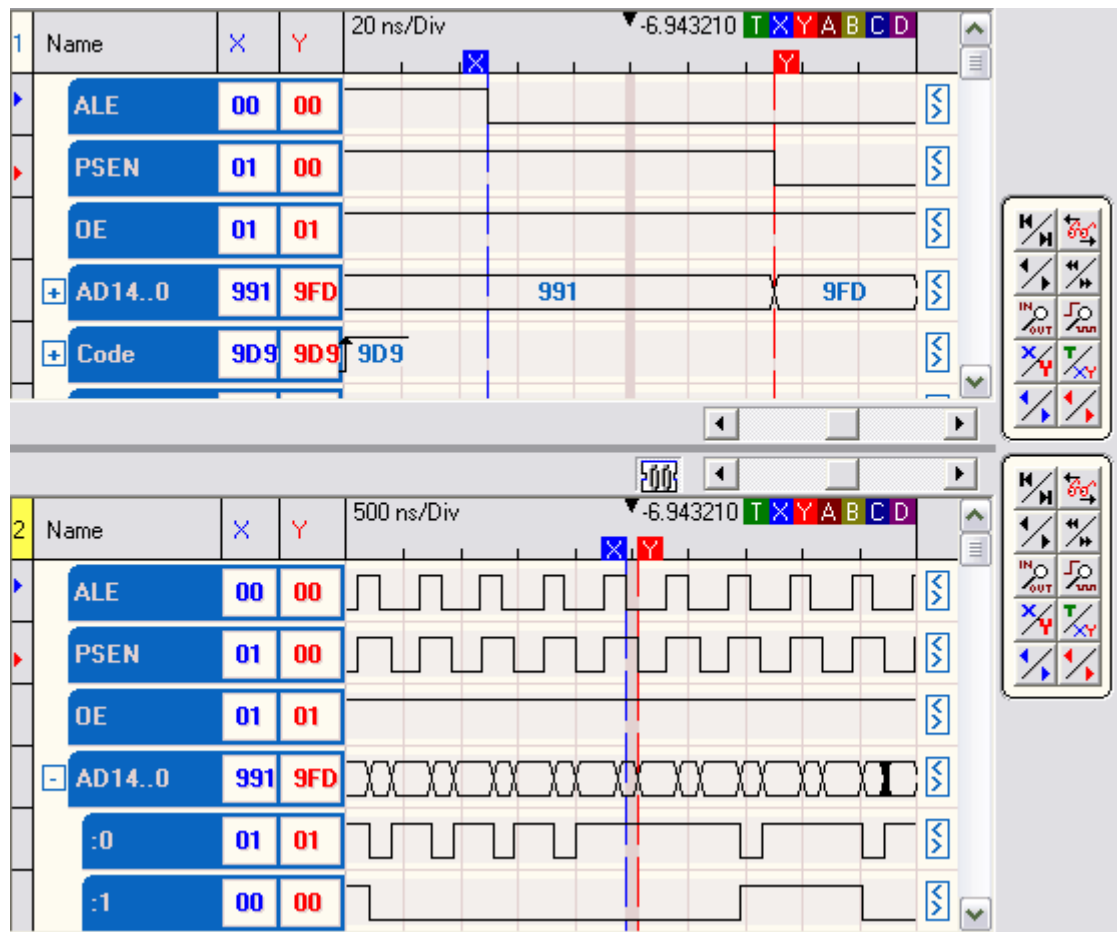
[Searching](#)

[Search Manager Windows](#)

[Search Types](#)

4.1 Waveform Views

Wave Form views are the central focus of navigating and analyzing the huge amount of captured data. In the waveform views you can Zoom quickly to different resolutions (without throwing data away), snap to edges or beginning of packets, drop markers to correlate time between transitions and much more.



Waveform View Function Summary

- View multiple signals in time correlation.
- **Expand** Multi-Channel Signals to see individual channel waveforms by using the "+" symbol to the left of the signal name.
- Individually reverse **Expand Order** of Multi-channel signals by menu.
- **Collapse** expanded Multi-Channel Signals by using the "-" symbol to the left of the signal name.
- **Zoom** in or out for more or less resolution.
- Single button **Zoom Max** resolution or **Zoom Min** resolution.
- **Marque to Zoom** function. (see: [Marque Zoom](#))
- **Scroll** by a single division or **Page** multiple divisions.
- **Free Scroll** vertically and horizontally by a Right-Click Drag.
- **Link** both Waveform Views at the center time for **Synchronous Scrolling** regardless of each view's zoom level. (see: [Using Link Groups](#))
- **Drop Marker** arbitrarily by Ctl-Drag or Drag & drop in the topmost row.
- **Snap Markers** to next or previous transition of a signal by Drag & drop. (see [Cursors and Markers](#))
- Snap Markers to next or previous transition and **Bring to Center** by Shift-Drag.

- **Snap Signal** to the next or previous transition by using the " <, > " indicators to the right of the signal.
- **Arbitrary Snap to center** and **Edge Snap to center** by a Left-Click anywhere on a signal.
- **Set, Clear** or **Jump** to markers.
- **Signal Row Order** can be re-arranged by dragging.
- **Bus Signal Format** can be set to HEX, Decimal or Octal.
- Independently select which signals to view in each Waveform View.
- **Edit Signal Properties** by menu or Left-Click on the signal's name. (see: [Signal Editors](#))
- **Print** current Waveform View or **Save as JPEG**. (see: [Printing](#))

To access the menu, Right-Click on a Signal name, the leftmost column or the topmost row. When clicking on the Signal name or leftmost column of a signal, the menu will have additional signal specific options.

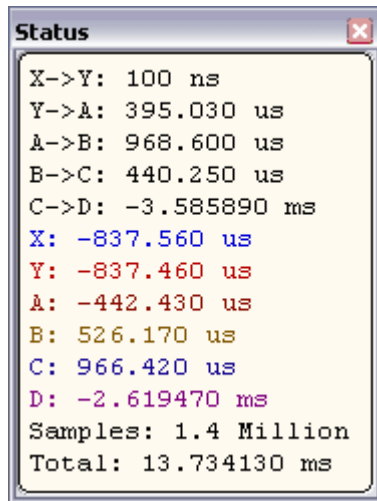


4.2 Using Cursors and Markers

Markers

Six markers (A,B,C,D,X,Y) are provided. Two of these markers (X & Y) have additional features and associated items in the program, so we will also refer to these markers as cursors. Markers have several uses. They can be used to measure time, to 'bookmark' locations and to help bring data to the center of the screen.

The Status window shows the current time of each marker (relative to TRIGGER) as well as the time between adjacent markers.

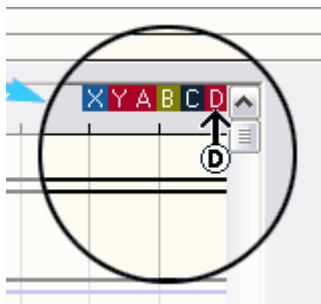


Drag to place

Simply click on a marker and drag it to the area of interest. You can grab the marker itself (the vertical line in the waveform area) or its 'flag' (the rectangle at the top of the window). Notice that the flags are offset so that even when they are overlapped, you can still grab them. When your mouse is in the capture zone for a marker, the cursor changes to indicate that it is over a marker. The cursor also indicates which marker would be selected, making it easier to grab a specific marker when they are very close together (or even on top of each other).

Quick Select Flags

Sometimes markers are invisible, buried behind other markers or off-screen. You can easily grab any marker from the quick-select flags at the top right corner of the window, regardless of their current position or visibility.



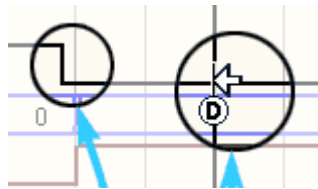
Dragging from these flags will bring the marker to the current screen position and make it visible if necessary.

Clicking on one of these flags will automatically scroll the waveform view to the markers position and center it in the waveform window. This can also be referred to as "**Jump to Marker**".

Auto-Snap

'Snapping' the markers to signal edges makes it easy to measure the time between them or to bring a specific edge to the center of the window. This operation is used so often that we optimized it by making it an automatic function. When you are dragging a marker and your mouse is over a waveform, the cursor changes to a 'snap-left' or 'snap-right' arrow. The

direction of the arrow shows you which edge (previous or next) of this waveform the marker will 'snap' to if you were to drop it at that point. The arrow will point to the nearest edge or to the nearest edge in the direction of mouse movement, even if that edge is off-screen.



If you do NOT want to SNAP, but rather wish to drop the marker exactly at the mouse position, you can either hold down the control key or move your mouse above or below all waveforms before releasing the mouse button.

Auto-Snap & Bring to Center

Hold the SHIFT key when 'Snapping' the markers to force the "snapped-to" edge to the center of the screen. This is extremely convenient when the next edge is not visible in the waveform window or if you want to use a marker that doesn't have a "tack" option (see: **X/Y Tack** below).

Drop & Bring to Center

Hold both the SHIFT key and the CTRL key when dragging a marker to "drop" the marker and bring the drop point and marker to the center of the screen.

Right Click Popup

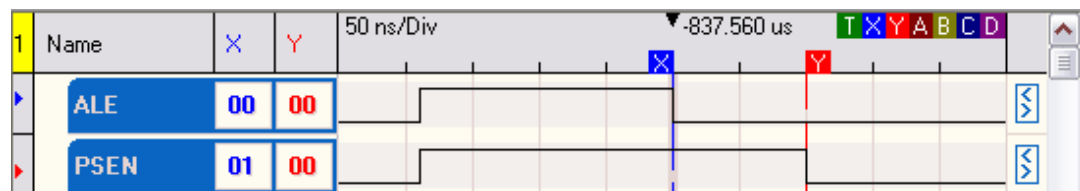
Right clicking on the name of the signal (or in the top margin) opens a pop-up menu with easy access selections to bring a marker to the center of the window, or to clear one or more markers. This provides another method of Setting, Clearing and Jumping to markers. If you click on the signal's name, then this popup menu will also include signal specific options.

X and Y markers

The X and Y markers have additional properties and associated items for easier navigation and support to 'bring the data to center' concept. Because of these features we also refer to these markers as Cursors. These specialized cursor features are detailed below.

Waveform Association

When you snap an X or Y marker to a waveform, it becomes associated with that waveform.



Small arrows in the left margin indicate which waveform the marker is tied to. The waveform association is used by the additional functions described below.

X/Y Snap

Dedicated SNAP X and SNAP Y buttons (in the toolbar to the right of the waveform view) snap the corresponding marker to the previous or next edge of the associated waveform.



This allows one to walk a marker from edge to edge on a specific signal. Having two of these markers allow one to walk through two different sections of data or two different signals. Each marker maintains its position, allowing one to jump back and forth between them. You can walk one signal for a while, jump to the other marker and walk that signal and then jump back to the first marker and pick up where you left off.

Left-Click to Snap Left.
Right-Click to Snap right.

Go To X/Y

A dedicated button in the toolbar on the right of the waveform view provides single click functions to jump directly to the X and Y markers. Left-Click to jump to the X cursor. Right-Click to jump to the Y cursor.



X/Y Tack

Modal buttons on the top tool bar enable/disable 'TACKing' the X and Y markers to the screen center. When one of these markers is TACKed, it will remain at the center of the screen.



You can still drag the marker (with or without auto-snap) to another point in the data, but when you release the mouse button, the marker AND the data will be brought to the center of the screen, ready for zooming in/out.

TACKing a marker is particularly useful for walking through a signal, edge by edge. Normally, when you SNAP the X or Y marker, the marker moves to the previous or next edge of the associated signal. When the marker is tacked, the DATA is brought to the MARKER (and the screen center). This allows you to walk through the data without continually re-centering the screen. It also supports our 'bring the data to the center..THEN zoom' paradigm.

Note that this is an intelligent TACK. It does NOT freeze the marker at the screen center. It brings the marker to center any time you move the marker (by dragging, snapping or setting its position). This allows the marker to stay at a specific TIME/EDGE if you scroll the screen or jump to another marker. The next time you attempt to move the TACKed marker, it will move relative to the place you left it, then bring it and the data to the window's center. For example, X and Y markers can both be TACKed. While you are moving/snapping the X marker, it stays as the center. You can jump to the Y marker and it starts tacking at the center. At any time, you could jump back to the X marker or simply press its SNAP-LEFT/RIGHT buttons and it again dominates.

4.3 Marquee Zoom

You can use your mouse to marquee an area of data to zoom in on. Click and drag to marquee a section. When you release the mouse button, the enclosed area will pan to the center of the screen and then zoom in as much as possible while keeping the entire area on the screen.

4.4 Toolbar Buttons

We make extensive use of the right mouse button. Most functions have naturally paired operations. Most paired functions are natural opposites (like left/right, in/out, first/last, previous/next). Others are not opposites but still naturally paired (like X/Y). We take advantage of this symmetry to double up the functions of most buttons and other clicks. This not only reduces desktop usage but also results in more natural, easier to remember functions.

For example, rather than having separate SEARCH LEFT and SEARCH RIGHT buttons, we have a SEARCH button. Left clicking the button will SEARCH LEFT; right clicking will SEARCH RIGHT.

After only a few minutes of use, this becomes much more natural than using separate buttons. Switching directions involves pressing different mouse buttons rather than moving the mouse to a new button in the application. All buttons in the tool bars to the right of the Waveform Views are dual-function. Additionally, you will find that left and right clicking on the "<" and ">" symbols, X value column, Y value column and various other buttons will perform similarly paired functions.



Goto X / Goto Y

Left Click - Goto X Cursor
Right Click - Goto Y Cursor



Goto Trigger / Goto XY

Left Click - Go to the Trigger Point Cursor
Right Click - Go to the midpoint of the X and Y Cursor, then Zoom to Fit in view



Link / Unlink Waveform Views

Down Position - Waveform views are LINKED for Synchronized Scrolling (first graphic above)
Up Position - Waveform views are NOT linked, allowing independent scrolling (second graphic above)

When Linked, all members of Link Groups 1 and 2 will also be linked. (see: [Using Link Groups](#))



Scroll by 1

Left Click - Scroll left by 1 division. LEFT means to scroll the view window to an earlier point in time. (hold to repeat)
Right Click - Scroll right by 1 division. Right means to scroll the view window to a later point in time. (hold to repeat)



Scroll by 5

Left Click - Scroll left by 5 divisions (1/2 screen) (hold to repeat)
Right Click - Scroll right by 5 divisions (1/2 screen) (hold to repeat)



Scroll Start/End

Left Click - Scroll to START of data
Right Click - Scroll to END of data



Search

Left Click - Search Left to previous match using selected Global Search
 Right Click - Search Right to next match using selected Global Search



Search Edit

Click to Edit selected Global Search



SNAP X

Left Click - SNAP the X cursor to the Previous edge
 Right Click - SNAP the X cursor to the Next edge



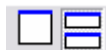
SNAP Y

Left Click - SNAP the Y cursor to the Previous edge
 Right Click - SNAP the Y cursor to the Next edge



TACK-X, TACK-Y

'Tack' the X/Y cursor to the center of the screen. When enabled, anytime the cursor is SNAPPED to an edge, the cursor will stay at the center of the screen and the data will SNAP to the cursor. When TACK is disabled, the cursor will SNAP to the data (even if that takes it off-screen). Note that it is possible to TACK BOTH cursors. Each will jump to the center of the screen whenever it is SNAPPED.



Waveform View

Click to change Waveform view to SINGLE or SPLIT view



Zoom In/Out Max

Left Click - Zoom IN ALL the way (Highest Resolution)
 Right Click - Zoom OUT ALL the way (show ALL data)

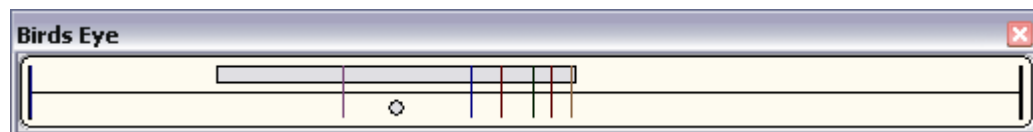


Zoom In/Out

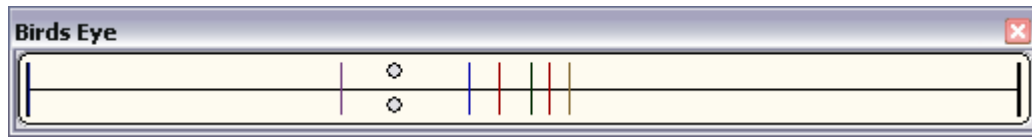
Left Click - Zoom IN one step (more detail, more resolution) (hold to repeat)
 Right Click - Zoom OUT one step (less detail, less resolution) (hold to repeat)

4.5 Bird's-Eye View

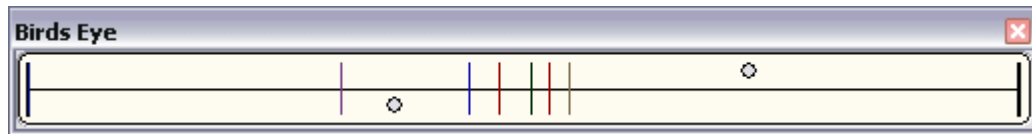
The BirdsEye window gives you the really big picture. It shows the relative zoom and position of the two waveform windows and the total data. The total data is shown with a horizontal line down the middle and 'goal-post' lines on the ends. The primary waveform window is represented with a gray rectangle in the top half of the display. Likewise, the secondary waveform window (if visible) is represented in the bottom half of the window.



When the window is zoomed in on a small percentage of the data (usually the case) the waveform representation becomes a small circle so that you can still see it. Otherwise it would degenerate into a very thin line.



As you navigate through the data, you can look at the BirdsEye to see exactly where you are in the data and how fast you are progressing through it. When you have both waveform windows open you can see their relative zoom levels as well as positions. If they are linked to each other, you will notice that they move together through the data.



Each of the markers are also shown with color-coordinated lines.

You can click on the BirdsEye window to position a waveform window in the area of the data clicked on. If the secondary waveform window is open, then clicking in the bottom half repositions the secondary waveform. Clicking in the top half repositions the main waveform. If the secondary waveform is not visible, then clicking anywhere in the window repositions the primary waveform window.

Press and hold the 'I' or 'O' keys to see the affect on the bird's-eye while zooming in and out.



4.6 Hot-Keys

The HOT-KEYs are not expected to replace a mouse, but rather, supplement it. When analyzing lots of data, it can be useful to use the keyboard for say, ZOOMING and SCROLLING while using the mouse for cursor control.

A, B, C, D, X, Y

(without shift) GOTO marker (A, B, C, D, X, Y)

(with SHIFT) SETS marker (A, B, C, D, X, Y) at current screen center

Alt+F

Open the FILE menu

Alt+C

Open the CONFIG menu

Alt+S

Open the SEARCH menu

Alt+W

Open the WINDOW menu

Alt+H

Open the HELP menu

I,O

(without SHIFT) Zoom IN/OUT one step (hold to repeat)

(with SHIFT) Zoom MAX IN/OUT

R

Run (initiate a capture)

T

GOTO Trigger point

Z

Zoom and pan to bring both cursors into view

<, >

(without SHIFT) Scroll LEFT or RIGHT 1 division (hold to repeat)

(with SHIFT) Scroll LEFT or RIGHT 5 divisions (1/2 screen) (hold to repeat)

[,]

Scroll to START or END of data

4.7 Table View Windows

Table views present the data as a list of numbers (tabular form). Table windows can be created after a signal of any type is created. To create a Table view, select any of the signals presented on the **New Table** submenu of the **Window** menu. Some signals in the menu will have "(raw)" appended to the signal name. These signals can be added to a Table view in their raw data format, but are better viewed in their decoded format using a List view. (see: [List Views](#))

Time: Auto	ALE	AD14..0	1	2	3
-1.800 us	0	0983	1	1	0
-1.560 us	1	0983	1	1	0
-1.450 us	1	094B	1	1	0
-1.370 us	0	094B	1	1	0
-1.260 us	0	09E0	0	0	0
-1.010 us	1	09E0	0	0	0
-910 ns	1	094C	0	0	1
-820 ns	0	094C	0	0	1
-720 ns	0	0960	0	0	0
-470 ns	1	0960	0	0	0
-370 ns	1	0974	0	0	1
-360 ns	1	0054	0	0	1
-360 ns	0	0054	0	0	1

- Multiple tables can be created and viewed simultaneously.
- Multiple signals can be viewed with each signal in a separate column.
- Multi-Channel Signals can be "expanded" to multiple columns.
- Expand order of Multi-channel signals can be reversed.
- Signal column order can be re-arranged by dragging.
- Bus Signals can be formatted as Binary, HEX or Decimal.
- Time Display can be set to Auto, ns, us, ms or sec.
- Time Format can be set to Delta or Absolute.
- Time Column can be hidden.
- Set, Clear or Jump to markers. (see [Cursors and Markers](#))
- Assign Time Synchronized Link Group. (see: [Using Link Groups](#))
- Select which Signals to view in each Table.
- Edit Signal Properties. (see: [Signal Editors](#))
- Print current Table View or Save as JPEG. (see: [Printing](#))
- Export data using Table's settings. (see: [Exporting Tables](#))

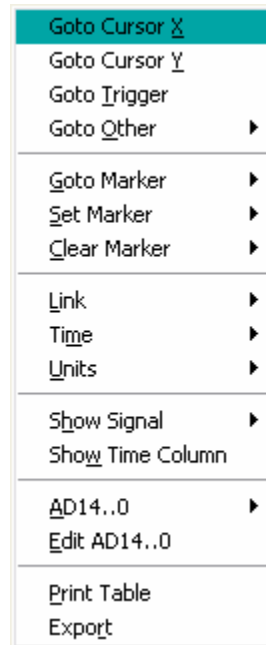


Table Menu

While most manufacturers provide table views, they generally are not too useful for anything other than STATE mode signals. Most logic analyzer demos will show data changing on every sample, making the table view look interesting in timing mode. However, in real usage, most signals do not change at anywhere near the sample rate, causing the table to show a small sample of stable data. You might have to scroll several screens before seeing the signal transition. We have added several enhancements to the basic table view to make them truly beneficial in real-world usage.

Compressed View

This mode compresses out the 'dead-time' between transitions, packing a lot more information into a screen of table data. Each line of data in the table contains the timestamp and the data. The time between lines varies and corresponds to the length of time the previous sample was stable. In this mode, a 40 line table contains 40 transitions. In linear (non-compressed) mode, it would contain 40 SAMPLES with perhaps NO transitions. If multiple signals are added to the table, the compression algorithm takes ALL signals in to account. A new line is shown any time ANY of the signals change state. Nothing is lost or thrown away. We simply compress out the redundant information, making the table hold more significant data. You can switch between compressed and linear views with a single click at any time.

Although compressed mode is the most efficient way to display a signal in tabular form, some people have trouble visualizing the non-linear, compressed time. You can Link a compressed table with other non-compressed tables or with waveform displays to correlate the data to a linear view. This allows BOTH an efficient table view and a linear 'in-context' view.

The included '8051.dat' example demonstrates this well. The OE signal in that example is spread across about 1.4 Million samples but can be displayed in less than 20 table lines when compression is enabled. When this table is linked to a waveform view, scrolling through this small table quickly scrolls the waveform to each significant event in the OE signal. This is a real-world example captured from a real embedded system.

Down Sampled View (Zoom)

Another approach to making the table view useful in normal timing modes is to use down-sampling. This mode presents the data in a time-linear format, but down-samples the data to reduce information. Down-sampling preserves linearity but reduces resolution. This is similar to turning down the sample rate while capturing data to extend capture times at the expense of resolution. Of course the key difference is we are post processing the data for the table view; not ignoring data during capture. In this mode, we are simply displaying the data with less resolution to allow the user to see more transitions while maintaining a linear time view. Since we have not changed the underlying data itself, you can 'zoom in' (reduce down-sampling) at any time to see more detail and actual timing. You can also link to other full-resolution tables or waveforms to get a simultaneous view of the full detail and the data's correlation to other signals.

Delta vs. Linear time

Regardless of the display mode(normal, compressed or down-sampled), you can display the time field in absolute or delta time. Absolute is the actual timestamp of the sample (relative to trigger). DELTA mode shows the time between table lines. This is most useful in compressed mode where it tells you the time between transitions. In normal and down-sampled modes, it simply tells you the sample rate(since the time between each line is constant).

4.8 List View Windows

List views present the decoded data of higher level signal types in column form. List windows can be created after a signal that is supported by a list is created. To create a List view, select any of the signals presented on the **New List** submenu of the **Window** menu. These signals can also be presented in their raw data format using a Table view. (see: [Table Views](#))

Time	Direction	Data Length	Data
-249.865820 ms	T	7-bit	008 04
-249.625310 ms	T	7-bit	009 04
-249.384640 ms	R	7-bit	009 50 00 00 00 00 00 00 01
-130.075860 ms	T	7-bit	008 04
-129.834620 ms	T	7-bit	009 04
-129.593950 ms	R	7-bit	009 50 00 00 00 00 00 00 01
0 ns	T	7-bit	008 04
240.500 us	T	7-bit	009 04
481.170 us	R	7-bit	009 50 00 00 00 00 00 00 01
100.010950 ms	T	7-bit	008 04
100.252190 ms	T	7-bit	009 04
100.492860 ms	R	7-bit	009 50 00 00 00 00 00 00 01
195.198640 ms	T	7-bit	008 04

- Multiple lists can be created and viewed simultaneously.
- Time Display can be set to Auto, ns, us, ms or sec.
- Time Format can be set to Delta or Absolute.
- Time Column can be hidden.
- Set, Clear or Jump to markers. (see [Cursors and Markers](#))
- Assign Time Synchronized Link Group. (see: [Using Link Groups](#))
- Select which Signal to view in each List.
- Edit Signal Properties. (see: [Signal Editors](#))
- Print current List View or Save as JPEG. (see: [Printing](#))
- Export data using List's settings. (see: [Exporting Lists](#))



Only certain signal types can be viewed in the List windows and each type displays the decoded data in a unique way. These types are listed below with a brief explanation of its display.

I2C Signal - The list format for this signal consists of an information, address and data column.

The information column is divided into three sections; Status, I/O, Packet Type:

Status:

- A - ACK
- N - NAK
- T - Terminated
- E - ERROR

I/O:

- R - READ
- W - WRITE

Packet Type:

- 7-bit - 7 bit Slave Address
- GCALL - General Call Address
- START - Start Byte
- CBUS - Beginning of CBUS packets
- RSRVB - Reserved Bus Address
- RSRV1 - First Block of Reserved Codes
- HS-MS - High Speed Mode Master Code
- RSRV2 - Second Block of Reserved Codes
- 10-bit - 10 bit Slave Address
- PGM!R - Program Slave Address without resetting
- PGM+R - Program Slave Address and Reset Slave
- MASTR - 7 bit Master Address
- ERROR - Illegal Write of ZERO
- !DEF! - Code is Not Defined

Asynchronous Signal - The list format for this signal consists of a HEX, ASCII and Status column.

Status:

- " " - No Errors
- F - Framing Error
- P - Parity Error
- B - Break

Synchronous Signal - The list format for this signal consists of a HEX and ASCII column. The ASCII column will be blank if the packet value is greater than an 8 bit ASCII value. If a packet is terminated prematurely when using the Enable qualifier, the HEX value will display the letter T.

State Signal - The list format for this signal consists of a HEX and ASCII column. If a packet is terminated prematurely when using the Enable qualifier, the HEX value will display the letter T.

4.9 Using Link Groups

Link groups provide **Synchronous Scrolling** of a group of windows that display data. When several windows are part of the same Link Group, each window will automatically update and scroll when any member of the group changes its center time. The time reference and displayed data of each member will "center" on the time the changing member centers on. This feature keeps a group of windows synchronized to the same time in the captured data.

DigiView provides five link options that include Link Groups 1 through 4 and a "no-link" option for windows that you want to keep independent.

Default link groups:

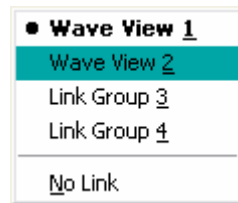
Link Group 1 - Waveform View 1 is always a member and all new windows initially belong to this group.

Link Group 2 - Waveform View 2 is always a member of Link Group 2.

Link Group 3 - Empty Group, ready for members.

Link Group 4 - Empty Group, ready for members.

The link group of any window that displays data (such as Tables and Lists), can be changed at any time. To change the group in these windows, Right-Click to access the menu of the window, then choose the desired option from the submenu of the "Link" menu. The options on this menu are displayed in the following Graphic.



All windows or views that can be assigned to a link group, will have a visible indicator with the group number or an " * " (asterisk) displayed. The asterisk indicates an independent window that is not linked to any group.

Typical Link Group indicators:



NOTE: When Waveform View 1 is "cross-linked" to Waveform View 2, all members of Link Groups 1 and 2 will also be cross-linked. Waveform Views are cross-linked by using the Link button at the top of Waveform View 2. (see [Waveform Views](#), [Toolbar Buttons](#))

4.10 Searches

When analyzing the captured data, the ability to search forward and backward for specific pattern matches or packet values, is indispensable. DigiView provides a general search type for pattern matches, several search types for specific signal types (such as I2C) and a Search Manager to quickly perform multiple searches and change criteria. The following sections provide details of DigiView's searching capabilities.

- [Defining Searches](#)
- [Performing a Search](#)
- [Using the Search Manager](#)
- [DigiView's Search Types](#)

4.10.1 Define Searches

New searches are defined by clicking on the "**Search->new**" menu item and selecting the type of search from the submenu. Multiple search types will be available depending on the type of signals that have been defined. For example, if you have defined a signal of type "I2C", then the I2C search type will be available from this menu. (For details on each search type, see: [Search Types](#)). After selecting the type of search to define, a new search definition will be created (with default properties) and its editor window will automatically open.

Searches are defined in terms of Signals matching specific criteria. Depending on the search type, one or more signals are selected and a match pattern, match value or other conditions are defined for each. Some search types even allow sequences of match conditions with the option of placing the match marker at a specific point in the match sequence. When ALL specified signals and conditions match the criteria, then we have a match.

All search types (and therefore all search editors) have the following common properties.

Search Name - Description

Use the Name field to describe the search. This descriptor will be displayed in the Search Manager Windows and in the Global Search selection box.

From - Where to begin Searching

The 'search from' selection determines where the search starts from; the current center of screen or the current marker location. Since the marker is placed at the center of the screen after the first search match, these are often the same during consecutive searches. The main difference occurs during the first search or between searches if you scroll the screen.

Set Marker - Mark the match point

The marker selection determines which marker is used to show the search match. You must select one. Whenever the search matches, the selected marker is placed at the match point and then centered in the searched window.



Delete Button - Deletes this search

Use the Delete button to dispose of the search and remove it from all search managers.

OK Button - Closes this search editor window

Use the OK button when you are finished making changes and want to close the editor for this search.

Search Button - Performs this search

Use the Search button to test the settings you have just entered for this search. Right-Click to search forward from the current time of the marker. Left-Click to search backward from the current time of the marker. When you are satisfied with the search settings, you can close the search and use any search button in the application to continue searching. (see: [Searching](#))

4.10.2 Searching

Search Button

Left clicking on a search button searches back in time (previous match.) Right clicking on a search button searches forward in time (next match.) See [Define Searches](#) for details on creating searches.

Invoking Searches

There are several methods of invoking a search. Each presents a slightly different way of selecting the search and the target window, but they all perform the search in the same manner.

If the search is configured to search 'from center time', then the search starts from the center time of the FOCUSED window (possibly the last match). Otherwise the search starts from the search's marker position (possibly the last match). In either case, the marker is positioned at the location of the search match and then the FOCUSED window is centered on the marker. If the window is part of a link group, then the entire link group is centered as well (see: [Link Groups](#)). The center time of the FOCUSED window does not change if the search fails.

Regardless of how the search is invoked, we actually always run the DEFAULT search on the FOCUSED windowed. We simply CHANGE the DEFAULT search or the FOCUSED window before running the search in some cases. This creates a very consistent environment where you can jump from one search button to another without surprises. The last invoked search is always the current DEFAULT search and the last searched window is always the currently FOCUSED window (until you do something to change it), regardless of how the search was initiated.

Global Search 

Beside the search selection box and search edit button is a SEARCH button. This search button performs the currently selected DEFAULT SEARCH, using the currently FOCUSED window as described without changing either.

Local Search

Each Data Table, List and Waveform window has a local search button. When you click on a window's local search button, that window becomes the FOCUSED window and then the search is applied to it as usual (using this newly FOCUSED window). Clicking on a local search button is the same as clicking anywhere on a waveform or table to FOCUS it and then clicking on the Global Search button.

Search Manger Searches

When you click on a search button in the search manager, the DEFAULT search is changed to that button's search and then the search is performed as usual (using this new DEFAULT search). This has the same results as selecting the button's search from the Default search selection pull-down and then clicking on the Global Search button. (see: [Search Manager](#))

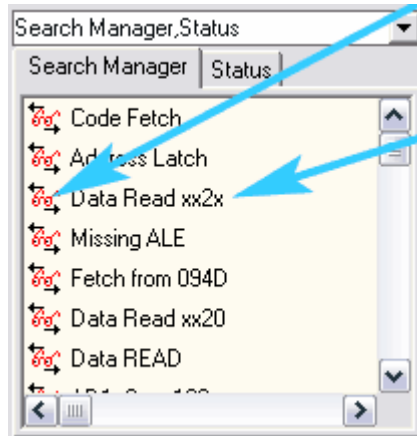
4.10.3 Search Manager Windows

The search manager window shows a list of all defined searches (see: [Define Searches](#)). It also provides an easy method of executing or editing any of the searches. This is particularly useful if you need to do a series of searches involving different search types.

To create a search manager, select "**New Search Manager**" from the **Window** menu. Multiple search managers can be created.

Each entry in the list includes a search button in the left margin. Left/Right click on any of the buttons to perform that search as described in the [Searching](#) section.

Click on the search name itself to open its editor. From the editor you can modify or delete the search.



4.10.4 Search Types

DigiView offers several types of searches to accommodate several types of signals. Depending on the search type, one or more signals are selected and a match pattern, match value or other conditions are defined for each. Some search types even allow sequences of match conditions with the option of placing the match marker at a specific point in the match sequence.

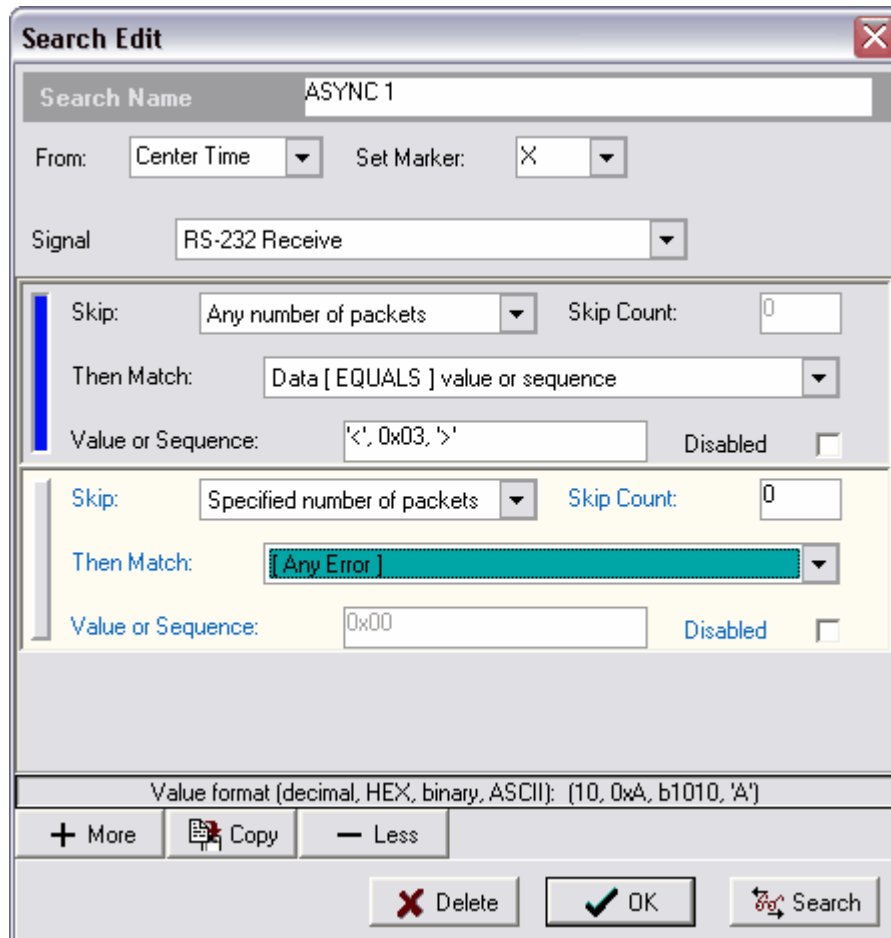
When ALL specified signals and conditions match the search criteria, the time of the match condition (or Match Point) will be centered in the window that has "focus". Any other windows that are a member of the same Link Group, will also center on the match point. (see: [Searching, Link Groups](#))

Details of each search type below are explained in the following sections.

- [Asynchronous Search](#)
- [I2C Search](#)
- [Pattern Search](#)
- [State Search](#)
- [Synchronous Search](#)

4.10.4.1 Asynchronous Searches

The Asynchronous search type is only available if an Asynchronous signal type has been defined (see: [Defining Search Types](#), [Asynchronous Signals](#)).



This search type has a group of search terms (or criteria) that is specific to Asynchronous signals, and can perform a search sequence by adding additional term groups. Groups can be added by using the Copy or More buttons.

You can see in the ASYNC1 search displayed above, that it is configured for 2 sequential searches. When the search button is selected, this search will walk through the signal's data until it finds a sequence of packets with data that matches the values defined in the first term group ('<. 0x03, >'). Then it will look at the very next packet (since the "skip count" is zero) to see if it has an ERROR. If this packet does, then the focussed window will scroll to the match point and set Marker X. If the next packet did not have an error, then the search starts over again from the packet AFTER the one that contained the ASCII character '<'. This sequence of searching will continue until a complete match is found or the end of data has been reached.

Skip: Determines whether to skip all packets until a match is found, or to skip the number of packets specified in "Skip Count" and then see if the next packet is a match.

Skip Count: Determines the number of packets to skip before looking for a match. This value is ignored if "Skip" is set to "Any number of packets".

Then Match: After skipping, this selection will determine the type of match to perform. Options include specific packet errors, any packet error and simple data comparisons (<, >, !=,=).

Value or Sequence: If searching for a comparison, you would enter the specific data or sequence of data here. When using a sequence of data, each value must match the comparison. For example if you specified "Greater Than" for the match, then specified "1, 2, 3" for the sequence. Then the first packet must be greater than 1, the second greater than 2 and the third greater than 3, before a match is declared. This value is ignored if searching for any packet error.

A sequence of values must be delimited by a "," or a space (or both). Each value can be specified as Decimal (0), HEX (0x00), binary (b00000000), ASCII ('0') or a mix of these formats as shown in the first term group above (ASCII, HEX, ASCII).

Match Point: The selected marker will be set to the match point when a match occurs. If multiple terms are used, then you can specify which term group should be used to mark the match time. In the graphic above, the first group has been chosen as indicated by the blue line to the left of the group. The line's color will reflect the color of the chosen marker when selected. To select a different group, use the mouse to click on the line to the left of the group. If no group is chosen, the first group will be the match point.

Disabled: Select this option to have the search ignore the term group.

Adding Term Groups: The "More" button is used to add term groups. Groups are added after the selected group. If no term is selected, then the new term is added to the bottom of all term groups. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Deleting Term Groups: The "Less" button is used to delete term groups. When deleting groups, the selected group will be deleted. If no group is selected, then the last group will be deleted. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Copying Term Groups: The "Copy" button is used to copy a term group. A copied group is added after the selected group. If no term is selected, then nothing will be copied. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

4.10.4.2 I2C Searches

The I2C search type is only available if an I2C signal type has been defined (see: [Defining Search Types](#), [I2C Signals](#)).

The screenshot shows the 'Search Edit' dialog box with the following configuration:

- Search Name:** I2C
- From:** Center Time
- Set Marker:** X
- Signal:** I2C
- Packet Format:** 7-bit - 7 bit Slave Address
- Address:** =, 0x0B
- Data:** Contains, 0xFF, 0xFF
- Cycle:** Write
- Status:** Any
- Data format (decimal, HEX, binary, ASCII):** {10, 0xA, b1010, 'A'}
- Buttons:** Delete, OK, Search

This search type has criteria that is specific to I2C signals.

You can see in the I2C search displayed above, that it is configured to search for a specific 7 bit Slave Address. When a 7 bit slave address is found it must first match the address condition (equal to 0x0B). If this condition is not satisfied, the search continues to the next slave address until a match is found. Once a match is found the next condition must be satisfied. If not, the whole search begins again until all conditions match or the end of data is reached. When a condition above is set to "any", the search will ignore that portion of a packet. For example if Address is set to "any" then any 7 bit slave address is considered for the remaining conditions.

Packet Format: Select the packet type to search for. If "GCALL - Any General Call Address" is selected, then the second selection box is activated for selecting a specific General Call or "Any General Call".

Address: Select "Any" to ignore the address value, or select a comparison type (<, >, <>, =) and enter the value for the comparison in the box below it.

Data: Select "Any" to ignore the data value(s) of this packet, or select a comparison type (=, <>, contains, No Data) and enter the value or sequence of values for the comparison in the box

below it.

When using a sequence of data, each value must match the comparison in sequence. In the example above, the packet must contain two consecutive values of 0xFF before a match is declared. This pair can occur anywhere in the data, as long as the two values occur together, in the order specified.

A sequence of values must be delimited by a "," or a space (or both). Each value can be specified as Decimal (0), HEX (0x00), binary (b00000000), ASCII ('0') or a mix of these formats.

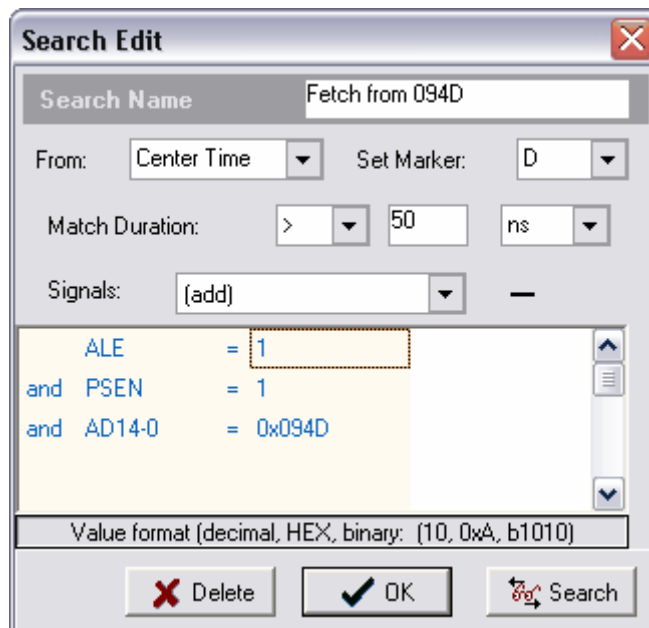
Cycle: Select "Any" to ignore the cycle type, or select the type of cycle (Read or Write).

Status: Select "Any" to ignore the packet status or select the status to match. Status options are NAK, ACK, ERROR, TERMINATE).

Match Point: The selected marker will be set to the match point when a match occurs. The match point is the starting time of the matching packet.

4.10.4.3 Pattern Searches

The Pattern search type is only available if a Boolean or Bus signal type has been defined (see: [Defining Search Types](#), [Boolean Signals](#), [Bus Signals](#)).



This search type can be used to find a value of one signal or a pattern of values in multiple signals, that lasts for a specified time period.

You can see in the "Fetch from 094D" search displayed above, that it will search for a pattern consisting of values from three signals (ALE, PSEN, AD14-0) that lasts for a duration of more than 50 nanoseconds. If this condition is found in the captured data, the specified marker will be set to

the time when the match occurs. In the above example, this would be 50ns after the matching pattern begins.

Match Duration: Determines whether to skip all packets until a match is found, or to skip the number of packets specified in "Skip Count" and then see if the next packet is a match.

Duration Units The duration qualifiers can be in ns,us,ms or sec and can use REAL numbers (1.23 us).

Signals: Select a signal from this list to "add" them to the search. Signals added to the search are displayed below the signal selection box where the pattern to match can be edited.

Match Pattern Format The match patterns can be specified in decimal, hex or binary. To indicate a HEX specification, precede the number with '0x'. To indicate BINARY, precede the number with 'b'. Binary specifications allow '0','1' and 'X' (don't care) characters. HEX specifications allow HEX digits (0-1,A-F) or 'X' for a nibble of don't care bits. Decimal specifications must use only 0-9.

4.10.4.4 State Searches

The State search type is only available if a State signal type has been defined (see: [Defining Search Types](#), [State Signals](#)).

The screenshot shows the 'Search Edit' dialog box for a search named 'STATE'. The search is configured with the following settings:

- Search Name:** STATE
- From:** Center Time
- Set Marker:** X
- Signal:** Code
- Search Criteria 1:**
 - Skip: Any number of packets
 - Skip Count: 0
 - Then Match: Data [EQUALS] value or sequence
 - Value or Sequence: 0x9FD
 - Disabled:
- Search Criteria 2:**
 - Skip: Specified number of packets
 - Skip Count: 0
 - Then Match: Data [NOT EQUAL] to value or sequence
 - Value or Sequence: 0x9D9
 - Disabled:
- Value format (decimal, HEX, binary, ASCII):** (10, 0xA, b1010, 'A')
- Buttons:** + More, Copy, - Less, Delete, OK, Search

This search type has a group of search terms (or criteria) that is specific to State signals, and can perform a search sequence by adding additional term groups. Groups can be added by using the Copy or More buttons.

You can see in the STATE search displayed above, that it is configured for 2 sequential searches. When the search button is selected, this search will walk through the signal's data until it finds the value defined in the first term group (0x9FD). Then it will look at the very next qualified state change (since the "skip count" is zero) to see if it does not have a value that matches the next term group (since the match condition is "Not Equal"). If it does not, then the focussed window will scroll to the match point and set Marker X. If the next state did have the specified value, then the search starts over again from the packet AFTER the one that contained the value '0x9FD'. This sequence of searching will continue until all match conditions are true or the end of data has been reached.

Skip: Determines whether to skip all packets until a match is found, or to skip the number of packets specified in "Skip Count" and then see if the next packet is a match.

Skip Count: Determines the number of packets to skip before looking for a match. This value is ignored if "Skip" is set to "Any number of packets".

Then Match: After skipping, this selection will determine the type of match to perform. Options include simple data comparisons (<, >, !=, =).

Value or Sequence: In this field, you would enter the specific data or sequence of data here. When using a sequence of data, each value must match the comparison. For example if you specified "Greater Than" for the match, then specified "1, 2, 3" for the sequence. Then the first packet must be greater than 1, the second greater than 2 and the third greater than 3, before a match is declared.

A sequence of values must be delimited by a "," or a space (or both). Each value can be specified as Decimal (0), HEX (0x00), binary (b00000000), ASCII ('0') or a mix of these formats.

Match Point: The selected marker will be set to the match point when a match occurs. If multiple terms are used, then you can specify which term group should be used to mark the match time. In the graphic above, the second group has been chosen as indicated by the blue line to the left of the group. The line's color will reflect the color of the chosen marker when selected. To select a different group, use the mouse to click on the line to the left of the group. If no group is chosen, the first group will be the match point.

Disabled: Select this option to have the search ignore the term group.

Adding Term Groups: The "More" button is used to add term groups. Groups are added after the selected group. If no term is selected, then the new term is added to the bottom of all term groups. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Deleting Term Groups: The "Less" button is used to delete term groups. When deleting groups, the selected group will be deleted. If no group is selected, then the last group will be deleted. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Copying Term Groups: The "Copy" button is used to copy a term group. A copied group is added after the selected group. If no term is selected, then nothing will be copied. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

4.10.4.5 Synchronous Searches

The Synchronous search type is only available if an Synchronous signal type has been defined (see: [Defining Search Types](#), [Synchronous Signals](#)).

The screenshot shows the 'Search Edit' dialog box for a search named 'SSYNC 1'. The search is configured for two sequential criteria. The first criterion is 'Data [EQUALS] value or sequence' with the value 'p', ^, 0x1B, 0, 0x60, 1, 0x60'. The second criterion is 'Data is [GREATER THAN] value or each value in seq' with the value 'v'. The dialog also includes fields for 'Skip' and 'Skip Count', a 'Value format' dropdown, and buttons for '+ More', 'Copy', '- Less', 'Delete', 'OK', and 'Search'.

This search type has a group of search terms (or criteria) that is specific to Synchronous signals, and can perform a search sequence by adding additional term groups. Groups can be added by using the Copy or More buttons.

You can see in the SSYNC 1 search displayed above, that it is configured for 2 sequential searches. When the search button is selected, this search will walk through the signal's data until it finds a sequence of packets with data that matches the values defined in the first term group ('p', '^', 0x1B, 0, 0x60, 1, 0x60). Then it will look at the very next packet (since the "skip count" is zero) to see if it has a value greater than the value of the ASCII character 'v'. If this packet does, then the focussed window will scroll to the match point and set Marker X. If the next packet value was less than or equal to 'v', then the search starts over again from the packet AFTER the one that contained the ASCII character 'p'. This sequence of searching will continue until a complete match is found or the end of data has been reached.

Skip: Determines whether to skip all packets until a match is found, or to skip the number of packets specified in "Skip Count" and then see if the next packet is a match.

Skip Count: Determines the number of packets to skip before looking for a match. This value is ignored if "Skip" is set to "Any number of packets".

Then Match: After skipping, this selection will determine the type of match to perform. Options include a Terminated Packet error and simple data comparisons (<, >, !=,=).

Value or Sequence: If searching for a comparison, you would enter the specific data or sequence of data here. When using a sequence of data, each value must match the comparison. For example if you specified "Greater Than" for the match, then specified "1, 2, 3" for the sequence. Then the first packet must be greater than 1, the second greater than 2 and the third greater than 3, before a match is declared. This value is ignored if searching for a packet error.

A sequence of values must be delimited by a "," or a space (or both). Each value can be specified as Decimal (0), HEX (0x00), binary (b00000000), ASCII ('0') or a mix of these formats as shown in the first term group above (ASCII, ASCII, HEX, DEC, HEX, DEC, HEX).

Match Point: The selected marker will be set to the match point when a match occurs. If multiple terms are used, then you can specify which term group should be used to mark the match time. In the graphic above, the second group has been chosen as indicated by the blue line to the left of the group. The line's color will reflect the color of the chosen marker when selected. To select a different group, use the mouse to click on the line to the left of the group. If no group is chosen, the first group will be the match point.

Disabled: Select this option to have the search ignore the term group.

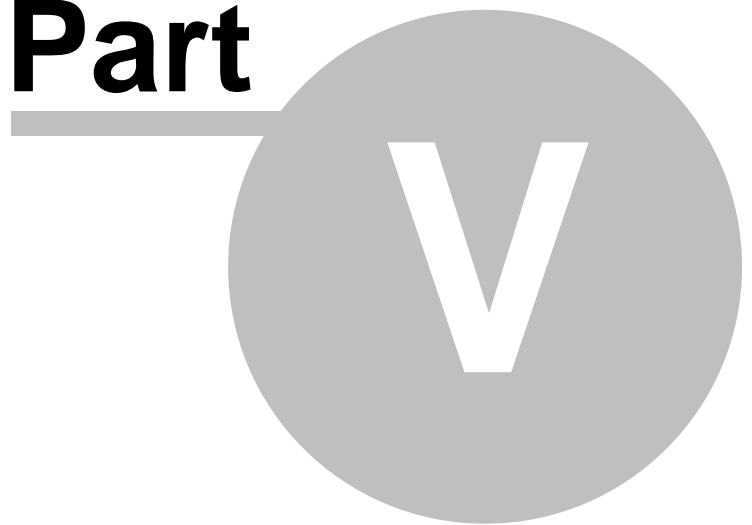
Adding Term Groups: The "More" button is used to add term groups. Groups are added after the selected group. If no term is selected, then the new term is added to the bottom of all term groups. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Deleting Term Groups: The "Less" button is used to delete term groups. When deleting groups, the selected group will be deleted. If no group is selected, then the last group will be deleted. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Copying Term Groups: The "Copy" button is used to copy a term group. A copied group is added after the selected group. If no term is selected, then nothing will be copied. When a group is selected, it will be "highlighted" using the current theme's Window Color. In the graphic above, the second group is selected.

Window Arrangement

Part



5 Window Arrangement

DigiView makes extensive use of Docking and Tabbing to permit very flexible window arrangements. All window settings, positions and sizes are saved along with the captured data anytime you save a file or exit the program. These settings are all restored when you start the software or load an existing '.DAT' file (see [Saving and Restoring](#)).

The main application is called the Primary window.
The windows created from the 'Windows' menu are called secondary windows.

[Docking Windows](#)
[Tabbing Windows](#)

5.1 Docking Windows

Dock Sites

The main application form has 4 docking sites; top, bottom, left and right. Any of the secondary windows can be 'docked' to one of these sites by dragging the window over the site.

Docking a Window

When dragging a window over a docking site, a gray rectangle appears to indicate that the dock site is willing to accept the window. Releasing the mouse button at this point docks the window to the main form at this spot.

Multiple windows can be docked into each of the dock sites in a variety of positions. As you drag additional windows over a given dock site, a different gray rectangle indicates where the window would split into the dock site. You can drag it near the top, bottom, left or right edges to control the placement.

If you drag the window inward a bit more, the rectangles change slightly to indicate a willingness to split the space occupied by an existing docked window, rather than the dock site itself. Dragging the window further towards the center of a docked window will cause the rectangle to center in the window, which indicates the new window will "TAB" with the existing window (see: [Tabbing Windows](#)). This flexibility allows you to dock the windows in virtually any configuration.

Floating a window

To 'undock' a window, simply drag it off of the dock site by its title bar, double-click its title bar or click on the down arrow in its upper right corner.

Over-riding Docking

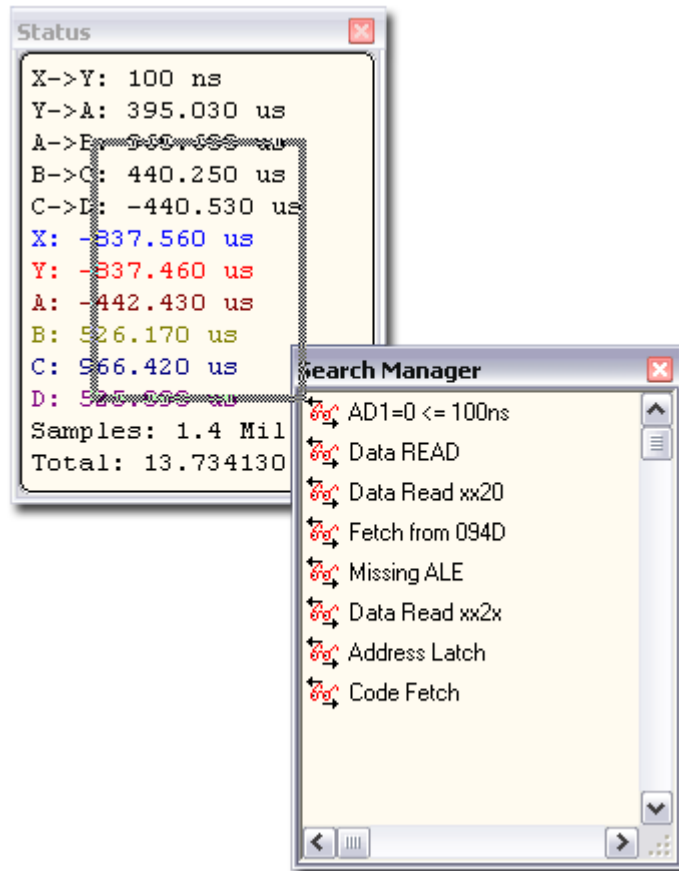
If you wish to drag a window near a dock site but do not want it to actually dock, hold down the control key while dragging. This will disable the docking behavior, allowing you to drop the window without docking it.

(also see: [Tabbing Windows](#)).

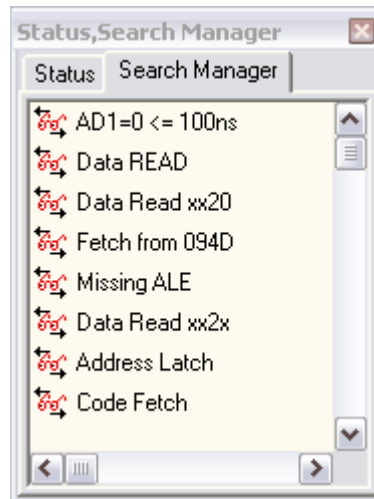
5.2 Tabbing Windows

Tabbing windows

Secondary windows can be merged together by dragging one window over another. When you drag any secondary window over another secondary window, a centered gray rectangle appears.



This indicates that dropping the window at this point will merge them together into a single window. Each original window appears on a TAB in the new window. Dropping additional windows onto the tabbed window creates additional tabs.



Tabbed windows can be docked just like any normal window. Also, a secondary window can be tabbed with a secondary window that has already been docked. Simply drag the window over the center of the docked window until you see the centered gray rectangle. This will TAB them together at the docked location rather than dock the new window next to the existing window.

Floating a tabbed window

You float a tabbed window just like a normal secondary window; simply drag it off of the dock site using its title bar, double-click its title bar or click on the down arrow in its upper right corner. This will float the entire tabbed window, keeping all of its tabs intact.

De-Tabbing a window

To remove a window from a tab, simply grab the tab and drag it or double-click on the tab. This extracts the window from the tabs and floats it. When only two windows are tabbed together and one of these is removed, the tabbed window will be disposed of and the remaining window will now occupy the position previously occupied by the tabbed window. If the tabbed window had been docked, then the remaining window is now docked in its place. See [Docking Windows](#) for more information on docking.

Tab Window Options

After "Tabbing" windows together, several display options are available from a pop-up menu that is accessible by Right-Clicking on any of the Tabs. For details on these options, see [Tab Window Options](#).

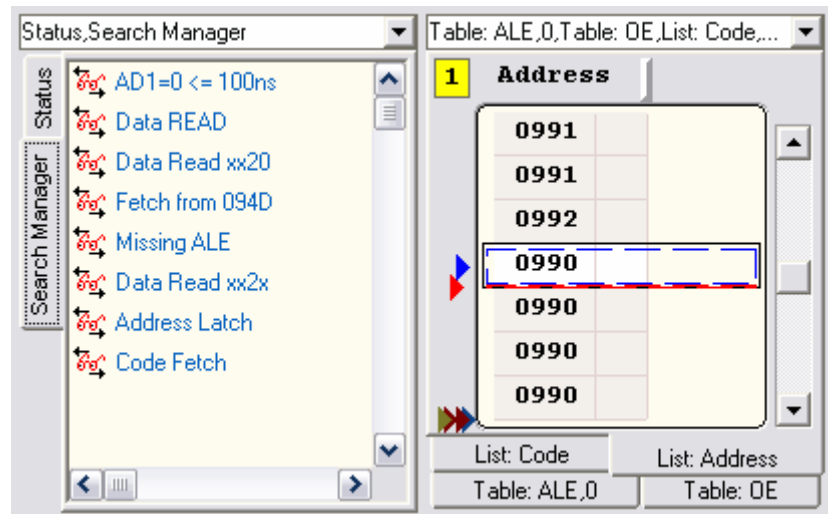
(also see: [Docking Windows](#) , [Tab Window Options](#)).

5.2.1 Tab Window Options

After "Tabbing" windows together, several display options are available from a pop-up menu that is accessible by Right-Clicking on any of the Tabs. Available options depend on the selected Tab Orientation.

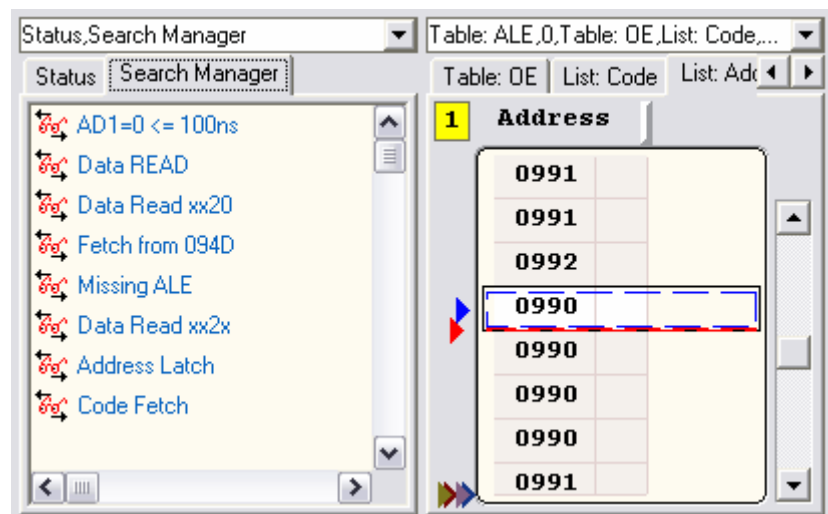
Tab Orientation

Options are TOP, LEFT, BOTTOM, RIGHT. Choose one of these options to change the placement of the Tabs in a tabbed window.



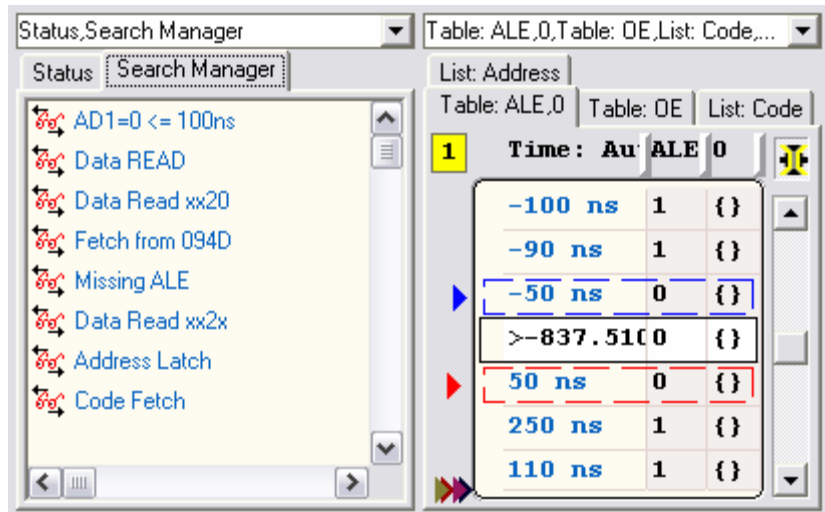
Tab Rows

Options are SINGLE, MULTIPLE. Choose multiple to have the tabs align in a single row with "scroll buttons" on the right. Choosing multiple will change the tabs to the default multiple row behavior and remove the "scroll buttons". Tab orientation must be set to Top or Bottom to select the Single option.



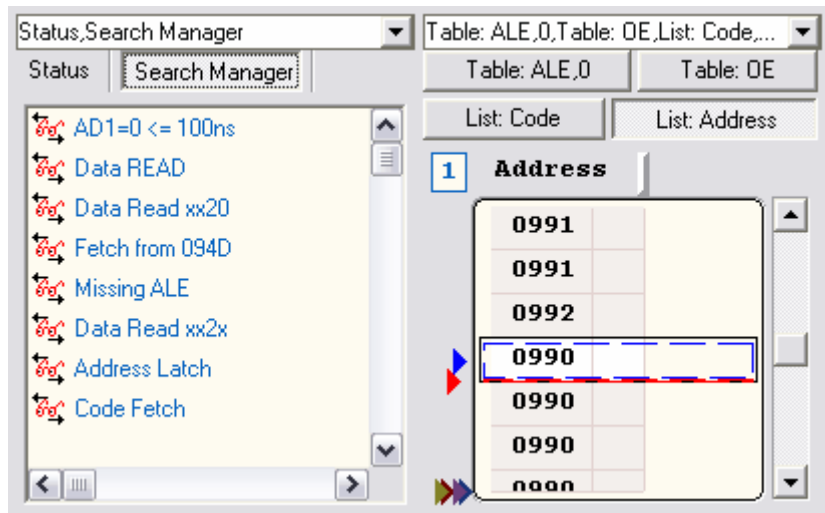
Tab Size

Options are STRETCH to FIT, NORMAL. Choose "stretch to fit" to have the tabs "fill" the available space when multiple rows are present. Select "normal" to size the tab to the length of its text.



Tab Style

Options are TABS, BUTTONS, FLAT BUTTONS. Tab orientation must be set to "TOP" to select the option of Buttons or Flat Buttons.



Exporting

Part



VI

6 Exporting

The captured data can be exported to a file in ASCII format for further analysis or documenting purposes. DigiView provides three export methods to choose from with each method having a few unique features. These features are documented in the next three sections:

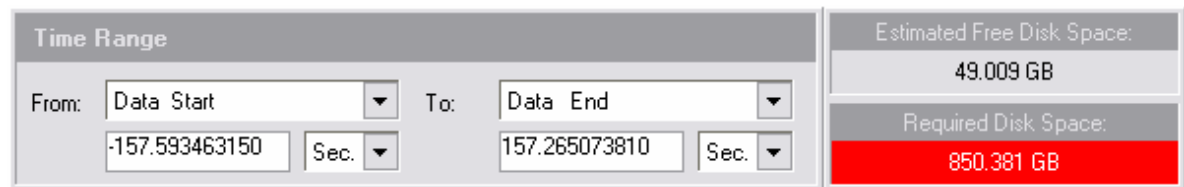
- [Exporting All Signal Data](#)
- [Exporting From List Windows](#)
- [Exporting From Table Windows](#)

Properties common to all three export methods are discussed below.



Export To

At the top of each export dialog, the file name and path for the export file will be displayed. To change the name or location, choose the button to the right of the filename. You can choose any valid storage device for your system including a Network Drive, Floppy Disk, FLASH Memory, and etc.



Time Range

Select the Starting time and Ending time of the data to export. You can select from several predefined time points (i.e. Waveform View 1 Start, Trigger, Marker X, etc) or select Custom to manually enter the time.

Estimated Free Disk Space

The available space of the export destination is calculated and displayed here. The available space will be calculated whenever the destination changes. While the export is in progress, this will be updated to keep you informed of remaining space. If the available space becomes too small for the remaining portion of the export, then the export will automatically finish without exporting the rest of the data.

Required Disk Space

The amount of disk space required to hold the exported data will be displayed here. Since all storage devices require a minimum amount of space to hold a file, the minimum file size will be shown if the exported data is smaller. If the export size is very large, the background color of this display will turn to yellow. If the export size exceeds the available space on the storage device, the background color will turn to red and the export prevented from being performed. The export size will be calculated whenever any option or the destination changes.

**Progress indicator**

The lower left portion of the Export dialog will display the progress of the export. The progress display will indicate the number of bytes already exported, the percentage of the data already exported and the number of bytes per second being written to the storage device.

Abort Button

The export can be canceled at any time by selecting the Abort button. All data exported up to the point of cancellation will be available in the exported file.

Close Button

To exit the Export window, chose this button. If an export is in progress, the export will be canceled automatically.

Export Button

After selecting the desired export options, chose this button to begin the export. This button will be disabled while an export is in progress or the export size is being calculated.

6.1 Exporting All Signal Data

This export method can be selected from the File menu and provides a means of exporting the raw data of all defined signals. The available options let you chose which signals to export, time format, numerical format, field separator, inclusion of line numbers, inclusion of a timestamp and whether to use compression. (see: [Exporting](#))

The Exported Data Example area will be updated automatically to reflect any changes in export options.

The screenshot shows a software interface for exporting data. It is divided into two main sections: 'Format Options' and 'Signal Selection'.

Format Options:

- Timestamp:** Radio buttons for 'Absolute' (selected) and 'Delta'.
- Numerical Format:** Radio buttons for 'Hex' (selected), 'Dec', and 'Bin'.
- Field Separator:** Radio buttons for 'Comma' (selected) and '='.
- Include Line Numbers:** Checked checkbox.
- Include Time Stamp:** Checked checkbox.

Signal Selection:

- Checked checkboxes for: ALE, PSEN, OE, AD14-0, Code, and Address.

Data Compression: Radio buttons for 'On' and 'Off' (selected).

Buttons: 'Clear All' and 'Select All' buttons.

Exported Data Example:

```

Line# ,Time ,ALE,PSEN,OE,AD14-0,Code,Address
0 , -6966050,0,0,1,9D9,9D9,9D9
1 , -6966040,0,0,1,9D9,9D9,9D9
2 , -6966030,0,0,1,9D9,9D9,9D9
3 , -6966020,0,0,1,9D9,9D9,9D9

```

Timestamp

If the "Include Time Stamp" option is selected, the time field will be formatted as the absolute time or (if set to Delta) as the time since the previous sample (or the last known sample after the starting time). If the "Data Compression" option is set to OFF and this option is set to Delta, then the time field will show the sample rate.

Numerical Format

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as a '1' or '0'). This option will display the format setting of a signal when a signal is selected. To change the format for a signal, first select the signal in the Signal Selection area. If changes are allowed for the selected signal, then the format options will "enable". Select the desired option.

Field Separator

Chose the character for separating each item on a line of exported data.

Include Line Numbers

Select this option to include a consecutive line number at the beginning of each line.

Include Time Stamp

Select this option to include the time of each exported sample.

Signal Selection

Check each signal to include in the export. The order of export is determined by the order in which each signal is checked. To have the export order match the listed order, use the Clear All button to clear all selections, then use the Select All button to select all the signals in the order shown. To move a signal to the end of the export line, uncheck and then recheck the signal.

When a signal is highlighted with the mouse, its export format setting will be shown in the Numerical Format option. This option can be changed by selecting the desired format (excluding

Boolean signals).

Data Compression

Setting this option to ON will greatly reduce the size of the export file. With compression on, the redundant or "dead" periods of data will be excluded and only changes in the data will be exported. If this option is set to OFF, then no data will be eliminated and all samples at the maximum resolution will be exported. This could lead to very long exports with sizes up in the Terabyte range.

Clear All Button

Use this button to "uncheck" all signals in the Signal Selection Area. Unchecked signals will be excluded from the export.

Select All Button

Use this button to "check" all signals in the Signal Selection Area. All checked signals will be included in the export.

Exported Data Example

This area provides an instant "preview" of the data to export and is updated when any option or signal selection is changed.

6.2 Exporting from List Windows

This export method can be selected from the File menu or directly from a List Window's menu. List Exports export the decoded data of higher level signals (such as I2C), and will have a slightly different set of options that are specific to each signal type. (see: [Exporting](#), [Signal Types](#), [List View Windows](#))

The Exported Data Example area will be updated automatically to reflect any changes in export options.

Numerical Format		Field Separator		<input checked="" type="checkbox"/> Include Time Stamp	<input checked="" type="checkbox"/> Include I/O Direction
<input type="radio"/> Decimal	<input checked="" type="radio"/> Hex	<input checked="" type="radio"/> Comma	<input type="radio"/> =	<input checked="" type="checkbox"/> Include Status	<input checked="" type="checkbox"/> Include Packet Type
Exported Data Example:					
-3640225640,T,W,7-bit,008,04					
-3639985130,T,W,7-bit,009,04					
-3639743700,N,R,7-bit,009,50,00,00,00,00,00,00,00,00,02,00,04,00,08,00					
-3520236640,T,W,7-bit,008,04					

Numerical Format

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as a '1' or '0'). This option will display the format setting of a signal when a signal is selected. To change the format for a signal, first select the signal in the Signal Selection area. If changes are allowed for the selected signal, then the format options will

"enable". Select the desired option.

Field Separator

Choose the character for separating each item on a line of exported data.

Include Time Stamp

Select this option to include the time of each exported sample.

Include Status

Select this option to include the Packet Status.

Include I/O Direction

Select this option to include the I/O direction (Read/Write).

Include Packet Type

Select this option to include the packet type.

Exported Data Example

This area provides an instant "preview" of the data to export and is updated when any option or signal format is changed.

6.3 Exporting from Table Windows

This export method can be selected from the File menu or directly from a Table Window's menu. Table Exports provide all the same options as the "Export All" function, but will automatically include all columns of the table. This means you will not have to select which signals to export, plus all channels of any signals that are "expanded" will also be included in the export. This is the only export method that will export expanded channels. (see: [Exporting](#), [Export All](#), [Table Windows](#))

Tables display and export signals in their "raw" data format. If you need to export the decoded data of higher level signals (such as I2C), then the List Export should be used instead. (see: [List Export](#), [I2C Signals](#))

The Exported Data Example area will be updated automatically to reflect any changes in export options.

Format Options	Signal Selection
Timestamp <input checked="" type="radio"/> Absolute <input type="radio"/> Delta	<input checked="" type="checkbox"/> ALE <input checked="" type="checkbox"/> -AD14-0:8 <input checked="" type="checkbox"/> AD14-0 <input checked="" type="checkbox"/> -AD14-0:9 <input checked="" type="checkbox"/> -AD14-0:0 <input checked="" type="checkbox"/> -AD14-0:10 <input checked="" type="checkbox"/> -AD14-0:1 <input checked="" type="checkbox"/> -AD14-0:11 <input checked="" type="checkbox"/> -AD14-0:2 <input checked="" type="checkbox"/> -AD14-0:12 <input checked="" type="checkbox"/> -AD14-0:3 <input checked="" type="checkbox"/> -AD14-0:13 <input checked="" type="checkbox"/> -AD14-0:4 <input checked="" type="checkbox"/> -AD14-0:14 <input checked="" type="checkbox"/> -AD14-0:5 <input checked="" type="checkbox"/> -AD14-0:6 <input checked="" type="checkbox"/> -AD14-0:7
Numerical Format <input checked="" type="radio"/> Hex <input type="radio"/> Dec <input type="radio"/> Bin	Data Compression <input checked="" type="radio"/> On <input type="radio"/> Off
Field Separator <input checked="" type="radio"/> Comma <input type="radio"/> =	
<input checked="" type="checkbox"/> Include Line Numbers <input checked="" type="checkbox"/> Include Time Stamp	
Exported Data Example: <pre> Line# , Time , ALE , AD14-0 , AD14-0:0 , AD14-0:1 , AD14-0:2 , AD14-0:3 , AD14-0:4 , AD14-0:5 , AD14-0:6 , AD14-0:7 0 , -6965950 , 0 , 9D9 , 1 , 0 , 0 , 1 , 1 , 0 , 1 , 1 , 1 , 0 , 0 , 1 , 0 , 0 , 0 1 , -6965700 , 1 , 9D9 , 1 , 0 , 0 , 1 , 1 , 0 , 1 , 1 , 1 , 0 , 0 , 1 , 0 , 0 , 0 2 , -6965590 , 1 , 990 , 0 , 0 , 0 , 0 , 1 , 0 , 0 , 1 , 1 , 0 , 0 , 1 , 0 , 0 , 0 3 , -6965510 , 0 , 990 , 0 , 0 , 0 , 0 , 1 , 0 , 0 , 1 , 1 , 0 , 0 , 1 , 0 , 0 , 0 </pre>	

Timestamp

If the "Include Time Stamp" option is selected, the time field will be formatted as the absolute time or (if set to Delta) as the time since the previous sample (or the last known sample after the starting time). If the "Data Compression" option is set to OFF and this option is set to Delta, then the time field will show the sample rate.

Numerical Format

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as a '1' or '0'). This option will display the format setting of a signal when a signal is selected. To change the format for a signal, first select the signal in the Signal Selection area. If changes are allowed for the selected signal, then the format options will "enable". Select the desired option.

Field Separator

Chose the character for separating each item on a line of exported data.

Include Line Numbers

Select this option to include a consecutive line number at the beginning of each line.

Include Time Stamp

Select this option to include the time of each exported sample.

Signal Selection

All Signals in the Table are automatically displayed in this area and "checked" for export. To exclude a signal from the export, cancel the export, remove the signal from the Table, then select export again. Optionally you could use the Export All function if you do not need to export the channels of "Expanded" signals. (see: [Export All](#))

When a signal is highlighted with the mouse, its export format setting will be shown in the Numerical Format option. This option can be changed by selecting the desired format (excluding

Boolean signals).

Data Compression

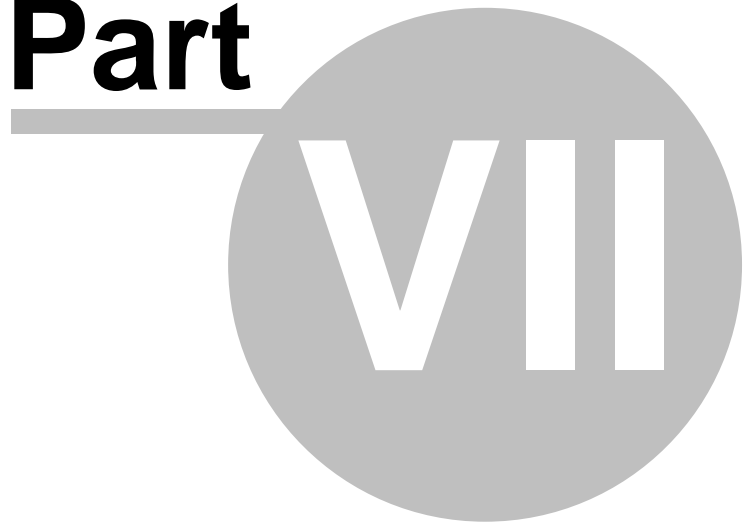
Setting this option to ON will greatly reduce the size of the export file. With compression on, the redundant or "dead" periods of data will be excluded and only changes in the data will be exported. If this option is set to OFF, then no data will be eliminated and all samples at the maximum resolution will be exported. This could lead to very long exports with sizes up in the Terabyte range.

Exported Data Example

This area provides an instant "preview" of the data to export and is updated when any option or signal format is changed.

Printing

Part



7 Printing

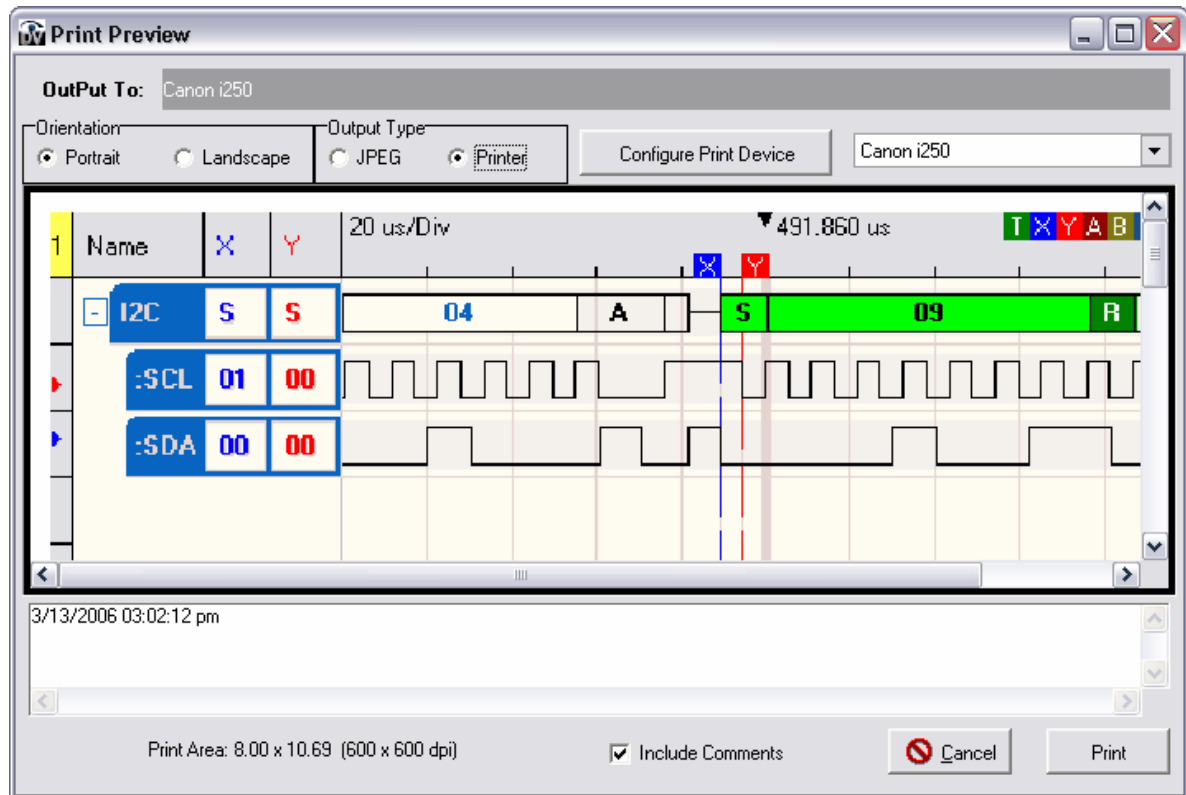
While analyzing the data, you may want to save a specific view to a graphic file or send it to a printer. Both of these functions can be done from DigiView's Print window. To open the Print window, select a Table, List, Waveform view or the main view from DigiView's FILE menu. The selected view will be presented in the Print window with the options set to JPEG by default. The view to print can also be selected directly from a view's popup menu.

Details of the Print Window's options are described in the next two sections.

- [Printing Options](#)
- [JPEG Options](#)

7.1 Printing Options

To send the view's image to a printer, select Printer as the Output Type. After selecting this output type, the options in the Print Window will change for printing.



OutPut To

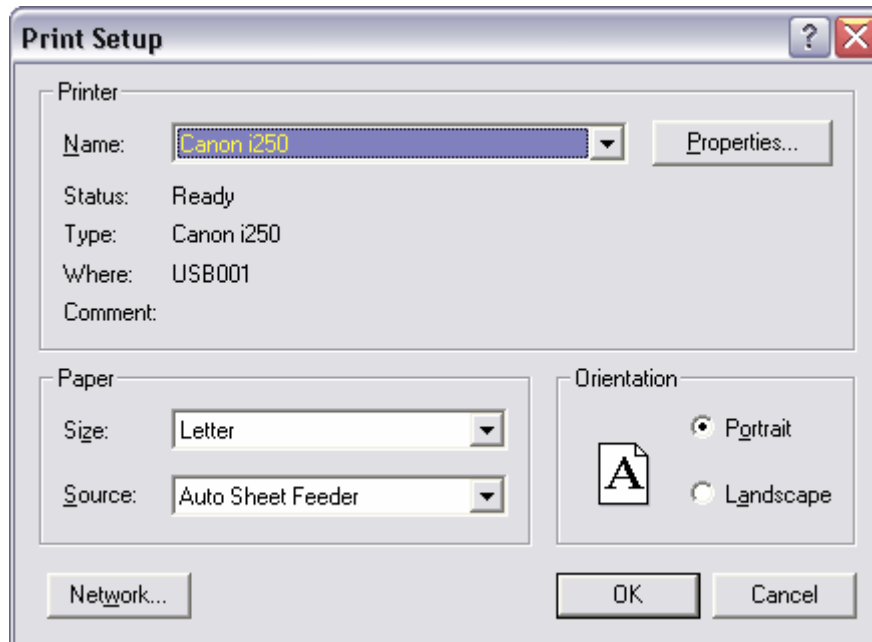
The currently selected printer name or print driver name will be displayed here.

Orientation

Select the orientation. This is the same setting that can be accessed from the Configure Print Device options.

Configure Print Device

Use this button to access all options of all available print devices.



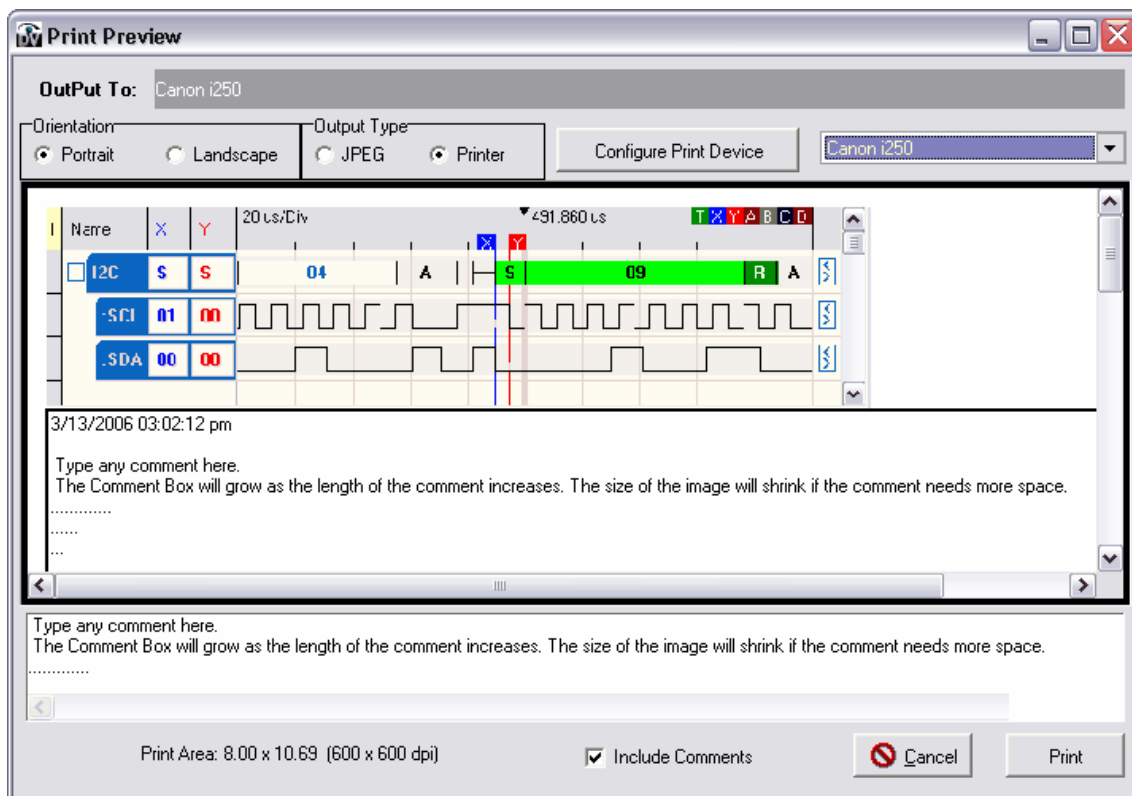
Select a different printer by using the selection box in this window. Available printers can also be selected in the selection box beside the Configure Print Device button if you do not need to access the printers detailed properties. Select the Properties button to access detailed options of the displayed printer.

Include Comments

Select this option to add comments to the Bottom of the image to be printed. When the Print Window is opened, the capture data and time are automatically added to the comment section. If you do not want to include the capture information, it can be deleted.

The comment box below the image to print will increase in size as you type comments. If the comment needs more room, the size of the image will decrease. The preview in the upper

portion of the window will automatically update as you change options or type comments.



Cancel Button

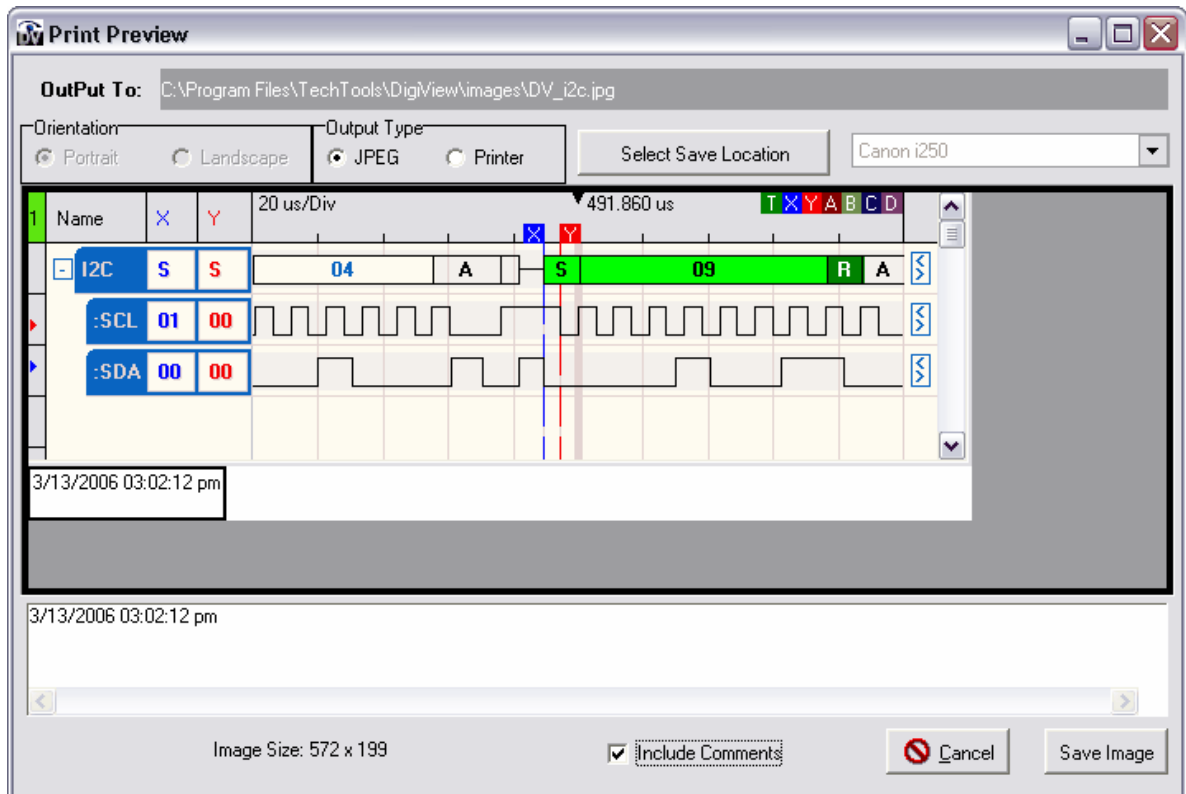
Use this button to close the print window without printing.

Print

Use this button to send the image to the printer.

7.2 JPEG Options

To save the View's image as a JPEG file, select JPEG as the Output Type. After selecting this output type, the options in the Print Window will change for JPEG images.

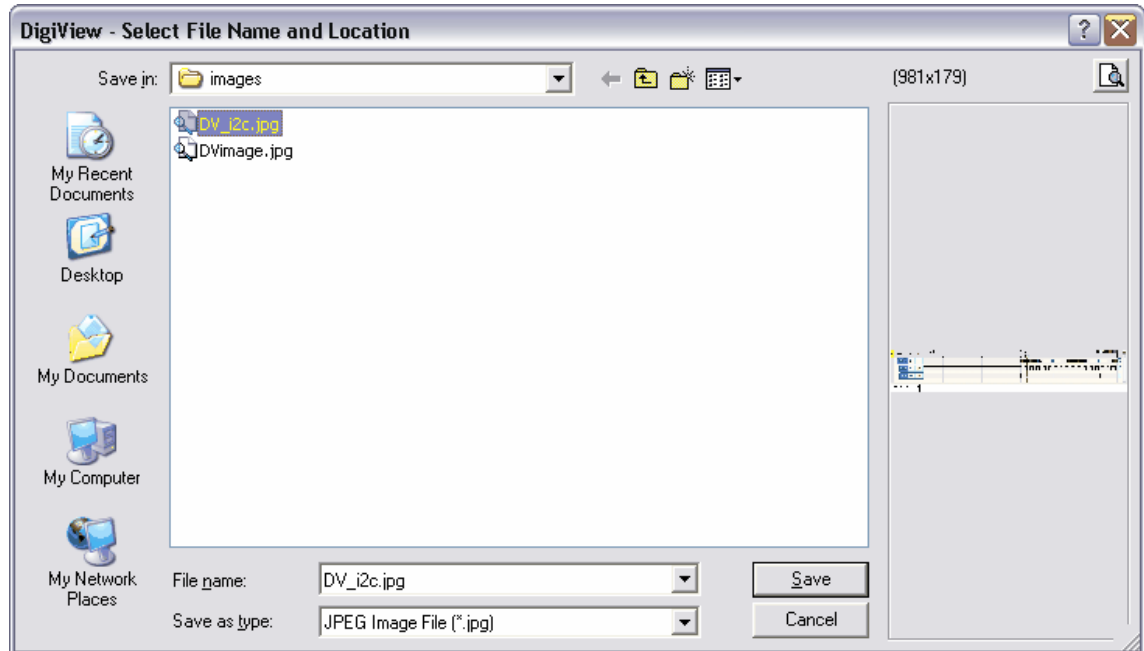


OutPut To

The currently selected image file name and path will be displayed here. Use the Select Save Location button to change the name or path and preview images already saved.

Select Save Location

Use this button to change the destination and save the image or preview images already saved.



To preview a saved image, select an image from the list, then use the button in the top right corner of the window.

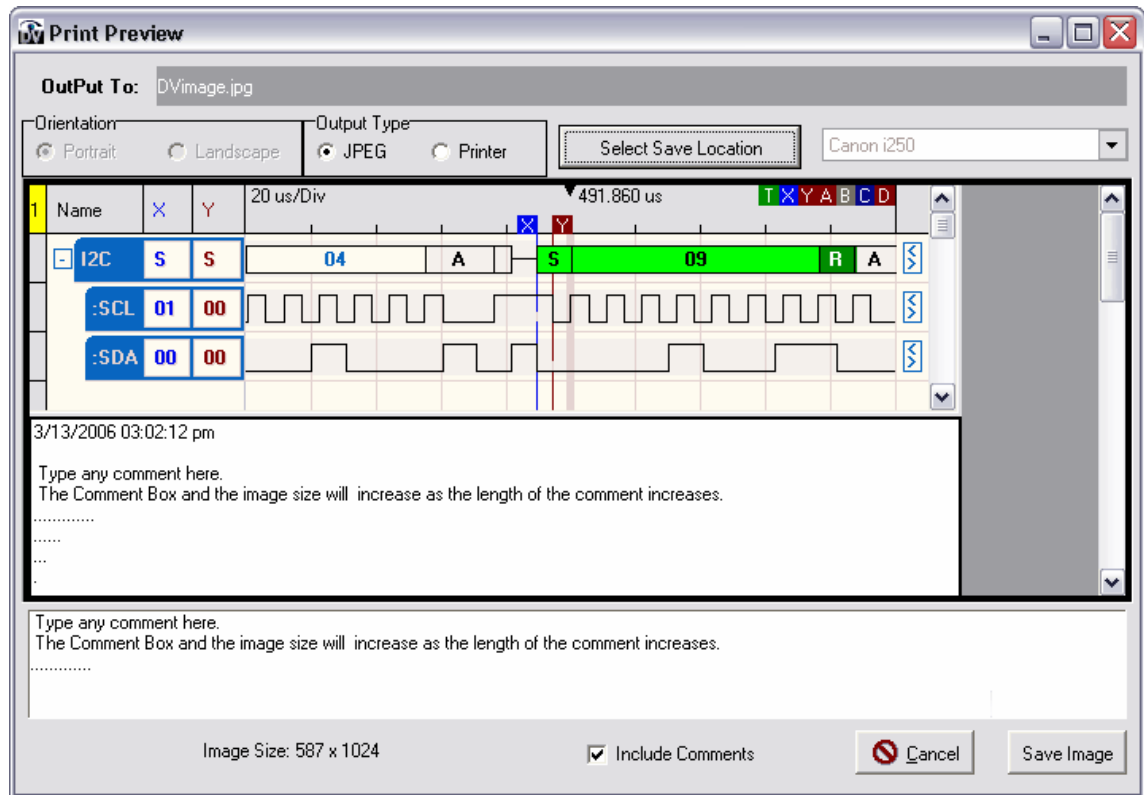
To exit this window without saving the image, choose the Cancel button.

Include Comments

Select this option to add comments to the Bottom of the image to save. When the Print Window is opened, the capture data and time are automatically added to the comment section. If you do not want to include the capture information, it can be deleted.

The comment box will increase in size as you type comments. Since the comment box is actually part of the image to save, the size of the image will increase as the comment needs more room. The preview in the upper portion of the window will automatically update as you change options

or type comments.



Cancel Button

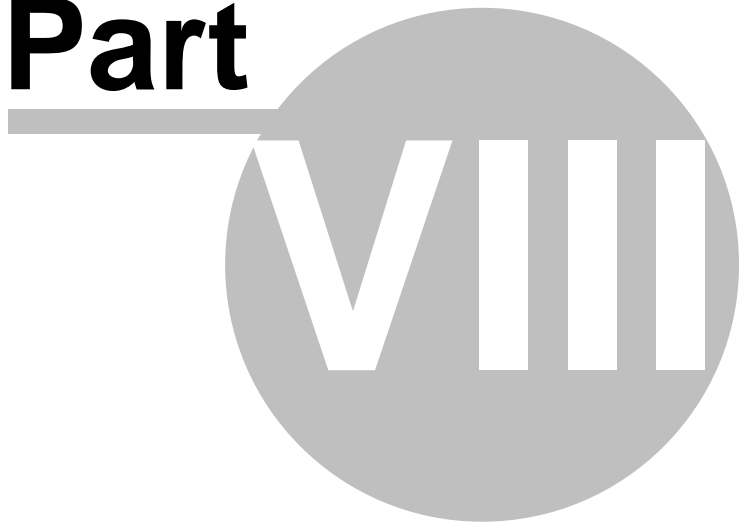
Use this button to close the print window without saving the image or if the image was already saved when selecting the destination.

Save Image

Use this button to save the image to the selected destination.

Saving and Restoring

Part



8 Saving and Restoring

Save As

The Save As function is under the FILE menu. The current state (Zoom, time, cursor locations, waveforms associations...), waveform definitions, trigger definitions and the entire data buffer are saved to the file you select. **The data is always stored in compressed format. The file is just over 1 Megabyte in size.**

Open

The Restore function is under the File menu (File->Open). This will load a previously saved data file along with all of its settings.

Auto Save/Restore

This option is found in the [Environment settings](#) (found under the CONFIG menu). When enabled (default), DigiView auto-saves the current data, settings and state when you exit the program and auto-loads this information when you start the program. The data is stored in 'default.dat'. This allows you to pick-up where you left-off the next time you start the software without having to save/restore. You can still save/restore manually anytime you want a specific snap-shot of the data.

New

To start completely fresh and eliminate all defined signals, searches, data, triggers and windows, select the New option from the File menu. For additional ways of starting a new session with some pre-defined windows, see: [Using Templates](#).

8.1 Using Templates

You may have spent some time Docking, Tabbing and resizing windows to achieve a comfortable window arrangement. To re-use the arrangement for a new session without starting with existing signals, searches, data and so forth, you can save the arrangement as a Template. (also see [Saving and Restoring](#)).

Save As Template

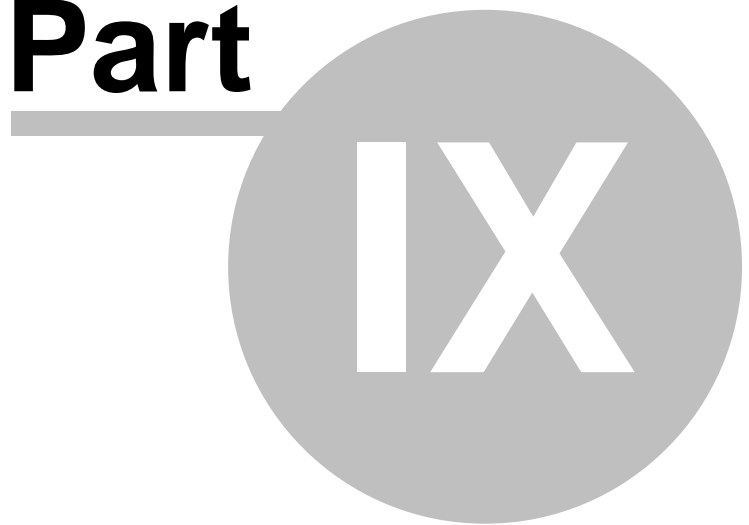
The Save As Template function is under the FILE menu. All window settings, positions, Dock sites and sizes are saved to a Template File (*.DVT) and all data, signals, searches, markers and trigger settings will be ignored.

New From Template

The New from Template function is under the File menu. This will load a previously saved Template File (*.DVT) to start a new session with some default window and docking arrangements.

Appendices

Part



9 Appendices

- A. [Understanding Auto-Prefill](#)
- B. [Understanding DigiView Compression](#)

9.1 Understanding Auto-Prefill

Sample Rate

DigiView works a little differently than most logic analyzers. There is no need for SAMPLE RATE settings or PRE vs POST fill settings. You don't really need to understand how we do this in order to use DigiView. This is really just here for the curious.

DigiView is always sampling data and storing it. Once it fills the buffer to half capacity, it continues storing data in a circular buffer fashion. This ensures current data while reserving one half of the data for post-trigger data. When you 'RUN' the analyzer, it begins looking for the trigger condition while still gathering samples as before. Once triggered, it allows the samples to fill the remaining half of the buffer and halts when full.

This approach means that the buffer is generally half full when you 'RUN' it. While you are looking at the last capture, the hardware is tracking current activity in real time. Sometimes people are surprised to see data in the buffer from seconds or even minutes before the 'RUN'. This can happen if the data is sparse (little activity before 'RUN' is pressed.)

Compression

DigiView's advanced hardware compression allows it to ALWAYS sample at 10ns, yet capture more data than most analyzers do even at reduced sample rates. Because of this, we do not need to make you make sample-rate vs. time-span trade-offs. This compression coupled with the 'always sampling' concept eliminates the need for selectable pre-fill/post-fill settings. There is always plenty of data in the buffer and plenty of room for post-trigger data.

If you 'RUN' before the buffer is half full, it will start looking for the trigger immediately and accept it as soon as detected. If no trigger is detected by the time the buffer reaches half full, then it will stop filing (but keep sampling in circular buffer mode) until a trigger is seen. You will ALWAYS have at least a half buffer of POST-TRIGGER data. If you want to ensure a lot of pre-fill, simply wait until the sample count gets to 50% before RUNNING. Usually there is enough data activity to ensure a half full buffer by the time you are ready to do another run.

HOWEVER, we realize that sometimes you don't care about what happened dozens of seconds ago. You can click on the 'SAMPLE COUNT' at the bottom of the window to purge the prefill buffer. Now, when you click on RUN, the prefill will only hold a couple of seconds of data.

Configuration

Finally, you can also disable the auto-prefill (rarely recommended) if you KNOW you always

want to purge the buffer before running. Note this will not eliminate prefill, but rather just purges the buffer before starting the RUN. If your trigger happens right away, you will have about 10% pre-fill. If it takes a while for the trigger to happen, you could have up to 50% prefill. This option is located on the CONFIG menu.

Conclusion

If you are more confused than when you started, then just leave the auto-prefill enabled and know that you are capturing lots of data before and after the trigger at 10ns sampling.

9.2 Understanding DigiView Compression

There is no need to understand DigiView's compression to use it. This is just here for the curious (or skeptical).

We want two conflicting features in a logic analyzer; high sample RATES (high resolution) and high sample COUNTs (a lot of data/time). We usually reduce sampling RATES to capture more data because sample COUNTs (data buffer depth) is fixed. To combat this trade-off, the sample buffer is made as deep as possible. However, this approach is linear and does not scale well. Doubling the buffer doubles either TIME or sample RESOLUTION. It can take gigabytes of memory to achieve both if your data transitions are fairly sparse (microsecond or more gaps).

Ideally, we would like to have high sample RATES AND high sample COUNTs to capture a long time-span with high resolution.

DigiView achieves this, like other logic analyzers, by using a deep data buffer (132,000 samples). However, DigiView also attacks this problem from another, even more effective angle. DigiView uses **real-time, hardware based compression** to eliminate dead-time from the data. This has a much greater impact than increasing the buffer depth.

The data captured in logic analyzer applications is often stable for multiple sample periods (particularly at higher sample rates). This, coupled with a fast sample times and a very long run-length limit, makes our compression very applicable in real-world applications.

The faster the sampling, the more compressible the data. DigiView ALWAYS samples at 10ns. Therefore it benefits from compression anytime the data lines are all stable for 20ns or more. Most systems have 'long' (relative to 10ns) dead periods.

Additionally, our compression lengths can be very long, making it very useful for 'sparse' data. If we have very long dead times, the compression goes way up, to a maximum of 262,000:1. While this might seem like 'specsmanship', considerable compression is achievable in real-world scenarios. **DigiView can gather over 5 MINUTES of relatively sparse data with 10ns resolution in some cases.** For example, an 8051 type microcontroller bus running at 11MHz typically compresses to better than 10:1. A 115Kbaud serial data stream typically compress nearly 1000:1. A 9600Baud stream would compress over 10,000: 1.

Another way of looking at the effectiveness of compression is to look at effective data stored rather than at the time compression. DigiView captures 132,000 samples of activity, regardless of the time between transitions (up to 2.6ms). Therefore, we could record over 13,000 serial characters (130,000 bits) at ANY baud rate down to about 400Baud. This is assuming worst case where EVERY bit is different than the previous. The character 0xAA is the ONLY one that meets this criterion. A serial data stream would average far fewer transitions per character rather than the 10 assumed here. The lower the baud rate, the higher the compression but the number of characters or bits captured remains the same (for a given data stream). In all cases, every edge is accurate to within our 10ns sampling period and the user does not have to configure anything.

If dead time exceeds 2.6ms, we lose 1 sample to track the time (2 samples at 5.2ms...). For example, a 60Hz signal would require 4 samples to record the time lapse between edges. DigiView would capture over 30,000 edges (15,000 cycles - over 4 minutes) of a 60 HZ clock with 10ns resolution.

The following two typical applications illustrate the effect of compression coupled with fast sampling. The data files from these captures are included in the software install so that you can evaluate the effectiveness yourself.

REAL WORLD EXAMPLE #1: (serial.dat)

We recently used a DigiView to monitor a serial transmit line on an embedded system. This system sent serial data to a 20x4 LCD display device. It sent a new screen of information approximately every 3 sec. DigiView captured over 5 MINUTES of real-time data (about 100 screen updates) at 10ns resolution. **Without compression, this would have required a buffer of over 30 Billion samples (90GBytes!).**

REAL WORLD EXAMPLE #2: (8051.dat)

We recently monitored an 8031 type microcontroller with muxed Address/Data. We were able to capture over 25,000 complete code fetches with 10ns resolution. Each code fetch included the muxed address/data bus (15bits), ALE, /PSEN and /OE. This target was running at 11.059MHz, but the results would have been the same at most any typical speed down to a few KHz (remember...the time between edges is compressed).

Final note: the data is compressed in real-time with dedicated hardware and is NEVER fully de-compressed (which could result in up to 90Gbytes of data). DigiView software transfers the entire compressed data buffer from the hardware to internal PC memory in compressed form. This allows us to transfer the entire buffer in about 1 second. The waveform display routines fetch only enough data from the compressed buffer to fill the display screen and even that is compressed.

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